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Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

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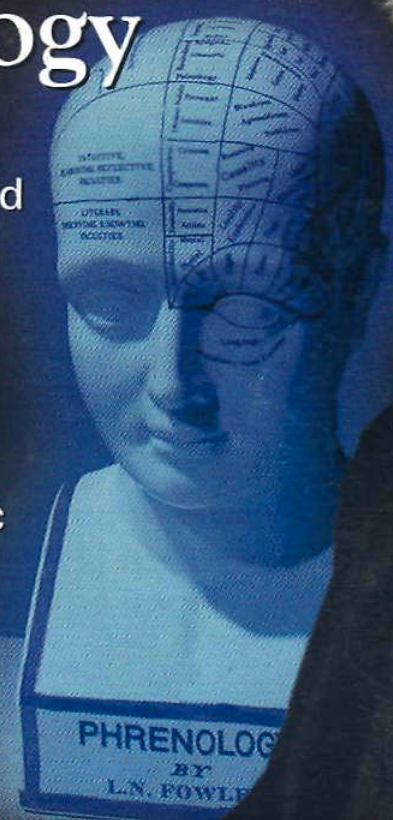
Mark Twain Debunks Phrenology



Myths of Murder and Multiple Regression

A University's Struggle with Chiropractic

Education, Scientific Knowledge, and Paranormal Belief

Three Skeptics' Debate Tools

Geology Curriculum Confronts Creationism

SPECIAL REPORT:

Disney Finds Atlantis
Atlantis Behind the Myth

Published by the Committee for the Scientific Investigation of Claims of the Paranormal

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EDITOR'S NOTE

Exploiting Human Tragedy, and the New No-Nonsense

Our November/December 2001 issue, with Joe Nickell's column "John Edward: Hustling the Bereaved" and other pieces skewering modern claims of "talking to the dead," had hardly been out three days when the inevitable happened. In this space in that issue, after discussing the September 11 terrorist attacks, I commented: "It may be awhile before the entertainment media get back to their old topics with the same force. But you can bet they will." My first example was the "paranormal bunk" of "medium" John Edward.

So we can be disgusted but hardly surprised that on October 25 Edward's television producers announced that they had scheduled a *Crossing Over* show in which Edward would supposedly contact some of the nearly 5,000 people who died in the World Trade Center tragedy. The depravity of such exploitation was lost on his coterie but not on the public. By the end of the same day, the negative reaction had been so quick and forceful the decision was reversed (see News & Comment, this issue). For a while, at least, reason and common sense prevailed. I wonder for how long?

* * *

The utter bankruptcy and banality of any claims to psychic abilities was made painfully obvious by the September 11 tragedies. What an opportunity for anyone who really had precognition to have performed an unprecedented public service: warn the authorities in advance with clear and specific information about the airliner hijackings and resulting mass murders so that the attacks could have been prevented. Obviously no one did. To all but committed believers, the conclusion is clear: Such abilities, unfortunately in this case, do not exist. Bryan Farha, a professor of education at Oklahoma City University and member of CSICOP's astrology subcommittee, wrote me to propose we run a Forum column with this introduction: "Following are detailed summaries of documented psychic predictions—to this author's knowledge—regarding the September 11, 2001, terrorist attacks on America:" That would be followed by a blank page.

You can bet, however, that when psychics come out with their annual year-end predictions, just about the time you receive this issue, some of them will somehow pretend they predicted the whole thing. It'll be interesting to see their rationalizations for why they forgot to mention this before September 11.

* * *

Another thing has been made clear since the attacks. Pseudomedical nonsense is not going to get quite the free ride it has for so long. When the anthrax mail attacks came, people turned to real medicine, not unfounded remedies. As Bob Park of the American Physical Society put it in his "What's New" electronic newsletter: "Fortunately those exposed to anthrax are being diagnosed and treated with the very latest scientific medicine. They are not being treated with homeopathy, acupuncture, touch therapy, magnets, reflexology, crystals, chelation, craniosacral therapy, echinacea, aromatherapy, or yohimbe bark. And no one is complaining."

The September 11 attacks may begin to usher in a new era of no-nonsense. People know they have no choice but to confront the real world directly, on its own terms. There is no escape into a trivial, pretend world of nonexistent woo-woo.

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Astrology Teaching May Enter Universities in India

PRASENJIT MAITI

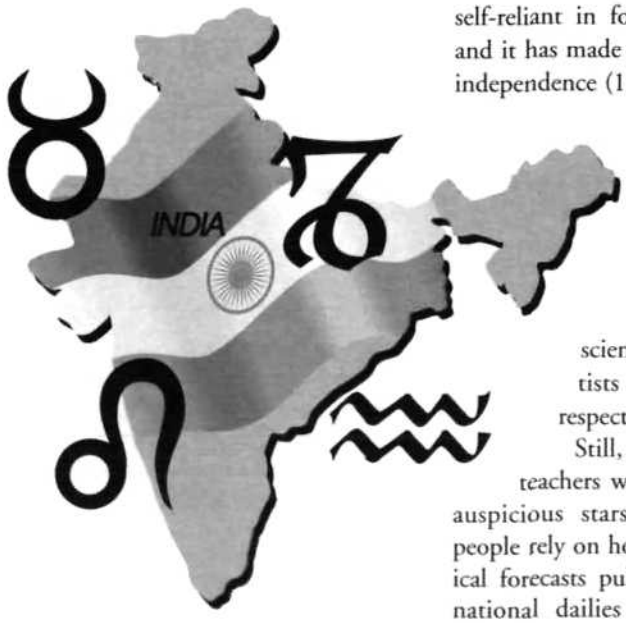
India's University Grants Commission (UGC) has recommended teaching of astrology and ancient Vedic Sciences at the undergraduate and postgraduate levels. This is in keeping with the revamped UGC's striking policy resolutions that are more often than not dictated by the Human Resource Development (HRD) Ministry of the central government (now being run by the Hindu "nationalist" Bharatiya Janata Party-led National Democratic Alliance since 1999).

India's HRD Minister has recently sacked the Director of the Indian Council of Social Science Research at New Delhi when the hapless official refused to tow the nationalist line of the Minister. The ex-Director of the Indian Council of Historical Research even stalled publication of two volumes of *Toward Freedom* that were being compiled by India's leading historians (to comprehensively document India's freedom struggle) whose "progressive" historiography the Minister did approve of.

India's history textbooks are to be rewritten now, and the emphasis would shift from a secular worldview (that underpins the country's multicultural pluralist lineage) to a dogmatic, if not distorted, rendering of events that unilaterally condemns the country's Muslim rulers as barbaric invaders who are to be held responsible for the degeneration of India's rich Hindu heritage and genesis of her communal tension.

The communist state governments do not fare any better. They would prefer to analyze India's national liberation (decolonization) movement along lines of traditional class dynamics, and even occasionally claim that they have been almost exclusively responsible for the uplift of the Indian people from two hundred years of British rule. This, however, is not at all consistent with the intellectual tradition of India's social praxes.

Regrettably, the Vice-Chancellor of a Calcutta-based university is among the first few academic enthusiasts who have uncritically opted for astrology teaching at the postgraduate level. But this is not surprising in a country that still comes across as a most intriguing array of paradoxes: India's computer scientists dominate the Silicon Valley, the country is self-reliant in food grains production, and it has made important strides since independence (1947) in areas of fundamental research like space technology, genetic engineering, marine biology, microbiology, and the earth and nuclear sciences. India's social scientists and intellectuals are respected around the world.



Still, India has university teachers wearing gems to invoke auspicious stars, the fatalist Indian people rely on horoscopes and astrological forecasts published in the leading national dailies and magazines, and fraudulent "god men" exercise tremendous clout in national affairs.

The UGC, however, is a class apart. It occasionally comes out with decisions that defy logic. What prompted it to launch astrology in the age of the so-called Digital Divide is anybody's guess.

Prasenjit Maiti is in the Department of Political Science at Burdwan University, West Bengal, India.

Poptronics' Readers Say 'Thumbs Down' to Pseudoscience

A year or so ago Gernsback Publications merged their electronics hobby magazines, *Electronics Now* and *Popular Electronics*, to form *Poptronics*. In the past these magazines contained tutorial articles and construction projects. The September 2001 issue of *Poptronics*, however, contained an eight-page article entitled "Radio Signals and the Great Pyramid." The essence of this article was that by coating the Great Pyramid with copper, filling the sarcophagus with sulfuric acid, and feeding radio-frequency energy into its passages we could convert the pyramid into a triode amplifier. This would provide a net power output and supply Cairo with electricity.

The article was written by Brenda K. Bayles, a self-described writer of nonfiction booklets that examine "physical science and The Theory of Everything." The Internet is awash with the writings of such hopeful amateurs, but it was discouraging to see a lengthy example appear in a normally factual magazine.

Much of the article consists of ill-digested chemical and electronic factoids; the rest is pure pyramid poppycock. The output of literal pyramid power is credited to the mysterious properties of limestone. We are told, "It is an igneous rock, created when molten materials beneath the Earth's surface were pushed to the surface and cooled." (Limestone is in fact a sedimentary rock formed from the shells of sea creatures.) Bayles assures us that when limestone is heated to 76 degrees Fahrenheit it becomes paramagnetic. She also describes it as a semiconductor, apparently on the grounds that galena, a totally different mineral, was used as a rectifier in early radios.

The text ranges from the simply wrong ("The Earth has moved on its axis no less than seven times throughout history"; "Hydrochloric acid is very close to sulfuric acid in composition,") to the incomprehensible ("Calcium electrons are uninterested in electricity until exposed to it, at which point calcium's electrons point towards the magnetic field").

Just as alchemists once pored through the hermetic spells of their predecessors, earnest seekers of free energy must interpret paragraphs such as, "Electrons enter the anode room ('King's Chamber'). Signal reflection has continued through the core stone to the anode room. Electron flow has mostly followed the grid, but overlapping radio signals still energize the core stones between Battery A and the anode room where a vat ('the sarcophagus') of acid awaits." Alas, free energy remains as elusive as the recipe for turning lead into gold.

The author's stirring conclusion brings to mind the writings of Dennis Lee and Joe Newman: "Working with stone is an exciting new way to use radio skills. What could be better than a project that could end up easing one's utility bills? The ultimate feat would be an electrical grid that would take care of all our energy needs, and it is a feasible idea." It seems the Stone Age is right around the corner.

I wrote to the editor of *Poptronics* to point out that publishing this article represented a major lapse in judgment and would mislead readers. I wasn't alone. Electronics hobbyists must be as critical of pseudoscientific BS as are skeptics. In an editorial in *Poptronics*' November issue the editor admits that the readers' responses to this article had been numerous, negative, and often vituperative. Some of the tamer letters were printed in the same issue. As the chastened editor wrote, "Unless I hear otherwise that 'stuff' won't be seen in these parts no more."

The impact of this stirring statement was somewhat vitiated by the appearance in the same issue of an article describing the time travel that allegedly occurred during the 1943 "Philadelphia Experiment." I shall charitably assume that this article was already in the production pipeline and couldn't be replaced in time.

—Tom Napier

Tom Napier writes from North Wales, Pennsylvania.

What's New? Four More Reports from the Weird Science Front

Here are a some recent items from the American Physical Society's "What's News" electronic newsletter, by Robert L. Park:

World Peace: If you can't donate $1 billion, how about a loan? Major newspapers, including the *New York Times* and the *Washington Post*, carried a full page ad on Sunday, September 23, from the Endowment Fund for World Peace. The ad called on "the world's wealthiest" to come up with $1 billion for world peace: "There must be a few peace-loving billionaires who can raise the money in one day." But in view of the urgency, the ad says, if some deep-pocket would just advance the money, the Endowment would repay the advance from donations of little schmucks like us. So who are these people, and what are they proposing to do with the money? They held a press conference at the National Press Club in Washington, D.C. The first speaker was John Hagelin, string theorist, perpetual presidential candidate of the Natural Law Party, and follower of Maharishi Mahesh Yogi. Hagelin explained that right now an elite corps of 40,000 Yogic flyers is training in India to "generate a powerful, scientifically proven unified consciousness field" that will give us permanent world peace. He was followed on live satellite hook-up by the Maharishi himself. In a rambling, at times incoherent speech, the Maharishi warned, "President Bush doesn't know science, he's uneducated, ignorant, and following the path of failure . . . the solution is with me."

Levitation: The 'science' of Yogic flying. It's a measure of how seriously the current situation is taken that two years ago Hagelin offered to end the violence in Kosovo with a mere 7,000 Yogic flyers ("What's New," April 9, 1999). He had come to Washington, D.C. with his proposal and in the most bizarre press conference in the history of the Press Club, he actually gave a demonstration of Yogic flying. Mattresses were spread right there on the floor, and twelve fit-looking young guys seated themselves in the lotus position. The audience was cautioned to make no sound as they meditated.

After a few minutes, one of them

suddenly levitated. Well, he didn't exactly float, mind you, just sort of popped up a couple of inches and thumped back down. Then another levitated, and another, till the scene looked like corn popping. There was nothing to suggest they didn't follow parabolic trajectories. My guess is they were suddenly contracting their gluteus maximus. It must be hard work. They were soon panting heavily.

Alternative Medicine: So why not just make it mainstream? Any physician entering practice today must deal with patients who use alternative therapies. Would it not make sense, therefore, for medical schools to educate doctors about unconventional therapies that their patients may already use? Georgetown University's medical school is the first in the nation to announce it will integrate information about such therapies into the curriculum, but scientists are troubled. By definition, these therapies are scientifically unproven; if they are proven, they cease to be alternative. The standard of proof used by proponents, however, is often lax. James Gordon, chair of the White House Commission on Complementary and Alternative Medicine, directs the Center for Mind-Body Medicine at Georgetown. Is there a mind-body effect? Sure there is. I doubt if Gordon can increase women's breast size by hypnotism, as he claims in his book, *The New Medicine*, but just reading the book made me physically ill.

Alternative Pregnancy: You better pray this study is wrong. A study of in-vitro fertilization finds that women who have people praying for them are twice as likely to become pregnant

from the procedure as those who don't. It was intercessory prayer, with prospective mothers in Korea, unaware they were prayees, while the prayers were women in the U.S., Canada, and Australia who did not know the women they were praying for. The researchers were at Columbia, and also knew nothing. *Science Daily* magazine called the results "surprising," but that's much too timid. We can now expect studies on what sort of prayers are most effective and to which god they should be directed, followed by lawsuits against anyone who prays for pregnancies that turn out badly.

—Robert Park

Robert Park is author of Voodoo Science.

John Edward's Televised Tragedy Séance Scrapped

In the wake of the September 11 terrorist attack, many people have tried to exploit the tragedy for personal and financial gain. Within days, firms began heavily marketing everything from gas masks and antibiotics to flags and guns, using the hysteria and fear to turn a profit. While encouraging Americans to buy flags and new cars profits from patriotism, others try to profit from grief and loss.

Medium John Edward, star of the syndicated show *Crossing Over with John Edward,* had planned to air a series of séances in which he would supposedly contact those who died in the attacks. Steve Rosenberg, president of domestic television for Studios USA (the producer of Edward's show), had tentatively scheduled the programs to air during the November sweeps period, when audience numbers are of paramount importance. Huge ratings during that time translate into big profits for Edward and *Crossing Over.*

Plans for the show were made public on October 25, 2001, in a report on the Web site of *Broadcasting and Cable* magazine. Objections sprouted up immediately from advertisers, USA Networks Inc. (the parent company of Studios USA), and some members of the public who had heard about the story. At the Committee for the Scientific Investigation of Claims of the Paranormal (publisher of the SKEPTICAL INQUIRER), Executive Director Barry Karr received over 100 e-mails from stunned and outraged skeptics who had learned of the story from the CSICOP announcement list. Many wrote angry letters to the Sci-Fi Channel and Studios USA complaining of tastelessness and exploitation.

Several stations and networks, including WCBS in New York and the Sci-Fi Channel, reportedly refused to carry the broadcasts capitalizing on the tragedy. According to Joe Flint of *The Wall Street Journal,* Rosenberg initially ignored the "unexpected" criticism, saying that the shows would go ahead regardless of the outcry.

But opposition to the show—and the public relations disaster that loomed because of it—finally became too much. Later that same day Rosenberg backtracked, announcing that the shows would not be broadcast after all because it might make viewers uncomfortable. Edward will have to settle for less publicity and money when he does his performance for those left grieving, in private and off the air.

—Benjamin Radford

Benjamin Radford is Managing Editor of the SKEPTICAL INQUIRER. □

10th European Skeptics Congress: Rise and Development of Paranormal Beliefs in Eastern Europe

MARTIN MAHNER

Skeptics from sixteen countries gathered at the Czech Academy of Sciences in Prague September 7–9, 2001, to attend the 10th European Skeptics Congress. This congress of the European Council of Skeptical Organizations (ECSO), which unites and represents skeptical organizations from fourteen European countries, was organized by the Czech skeptics.

The conference was devoted to examining the rise and development of the paranormal scene, and especially alternative medicine, in the Eastern European countries since the downfall of the communist regimes. The status of alternative medicine in some Western European countries, such as Germany and the Netherlands, was also explored, as well as talks on the UFO phenomenon, the role of Rupert Sheldrake's alleged morphogenetic fields in crystal formation, the scandal around the French astrologer Elisabeth Teissier (who recently got a Ph.D. in sociology from the reputable Sorbonne university), and many, many more.

Although it is true and well known that a wave of paranormal belief systems swept into the Eastern European countries after the breakdown of their communist regimes, it is also true, though lesser known, that many paranormal belief systems had been present before, in some cases even enjoying state support.

In Bulgaria, people were driven into the hands of alternative healers not so much by gullibility as by the capitalist overhaul of the country's health system.

In the Czech Republic, for example, there had existed a long tradition of parapsychological research, as Professor Vojtech Mornstein from the biophysics department of Brno University reported. Although the official "scientific" Marxist doctrine did not allow for mysticism and parapsychology, such research was fine when sufficiently disguised or cloaked in Marxist terms, or when reference could be made to Russian scientists engaging in such research. Thus, parapsychology was called "psychotronics," and Kirlian photography was after all supported by the Soviets.

The situation was similar in the former Soviet Union, where there had also been a long tradition of parapsychological research, as Professor Eduard Kruglyakov from the Budker Institute of Nuclear Physics told the audience. Another prominent field had been pseudophysics, such as research on antigravitation. Nevertheless, the big "outburst of the paranormal" occurred only after 1989—and it was sometimes supported by high representatives of the government, in particular the former president Boris Yeltsin, who relied on astrology among other dubious things.

Kruglyakov was happy to report that back in 1998 the Russian Academy of Sciences established a twelve-person committee devoted to fighting pseudoscience. The committee has shown early successes. Astrological columns have disappeared from some newspapers, for example, and other papers have reinstalled a science section.

As for alternative medicine, Professor Jiri Hert from the department of

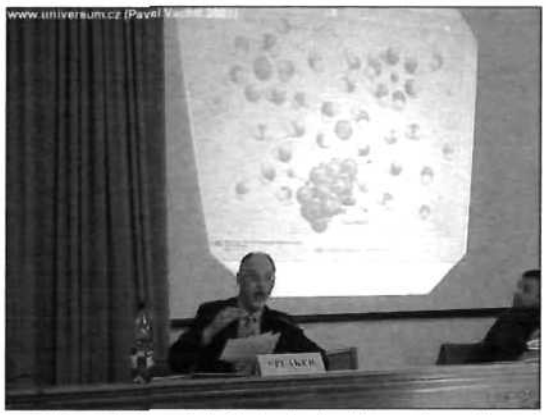
Martin Mahner is Executive Director of the Center for Inquiry–Europe in Rossdorf, Germany.

anatomy of Plzen University explained that acupuncture, magnetic therapy, and herbal medicine had been in use in the Czech Republic before 1989. After 1989, the main Western imports were homeopathy and cluster medicine. By contrast, chiropractic and anthroposophic medicine play no important role, although an increased tolerance of the use of mistletoe extract in oncology departments can be observed, as Dr. Leme deplored. As anthroposophic medicine is perhaps most widespread in Germany, it was of particular interest to learn from Dr. Barbara Burkhard that there now are studies indicating that the use of mistletoe extracts in fact accelerates tumor growth in patients with lymph node metastases, and moreover leads to a significant increase in brain metastases and a decrease in overall survival time.

The situation in Bulgaria was described by Professor Tchoudomir Nachev, president of the Bulgarian National Academy of Medicine. In Bulgaria, people were driven into the hands of alternative healers not so much by gullibility as by the capitalist overhaul of the country's health system. Thus, normal science-based health care as well as most drugs simply could no longer be afforded by many people. No surprise, then, that alternative practitioners were able to thrive by opening offices and clinics all over the country offering affordable and, truly in the two senses of the expression, "alternative" health care.

The European skeptics were especially pleased that the conference was hosted by the Czech Academy of Sciences, and that among the participants there were representatives from various scientific academies. One of the speakers was Professor Pieter Drenth, the president of ALLEA (All European Academies), which is the Federation of National Academies of Sciences and Humanities, representing thirty-eight academies from Europe as well as Turkey and the United States. Drenth informed ECSO that concern about the rise and spread of pseudoscience has finally reached the various academies of science. This is an encouraging sign that in the future the skeptical movement may expect more support by leading scientific organizations. Although the skeptical movement is lucky to count quite a number of outstanding scientists among their members and supporters, too many scientists are still reluctant to join in, usually believing that it is a waste of time to deal with pseudoscience. This may even be true from a narrow research point of view, but certainly not from the wider perspective of educational and societal responsibility.

CSICOP Executive Director Barry Karr talks with fellow skeptics during conference break. Photos from http://universum.150m.com/esc2001/.

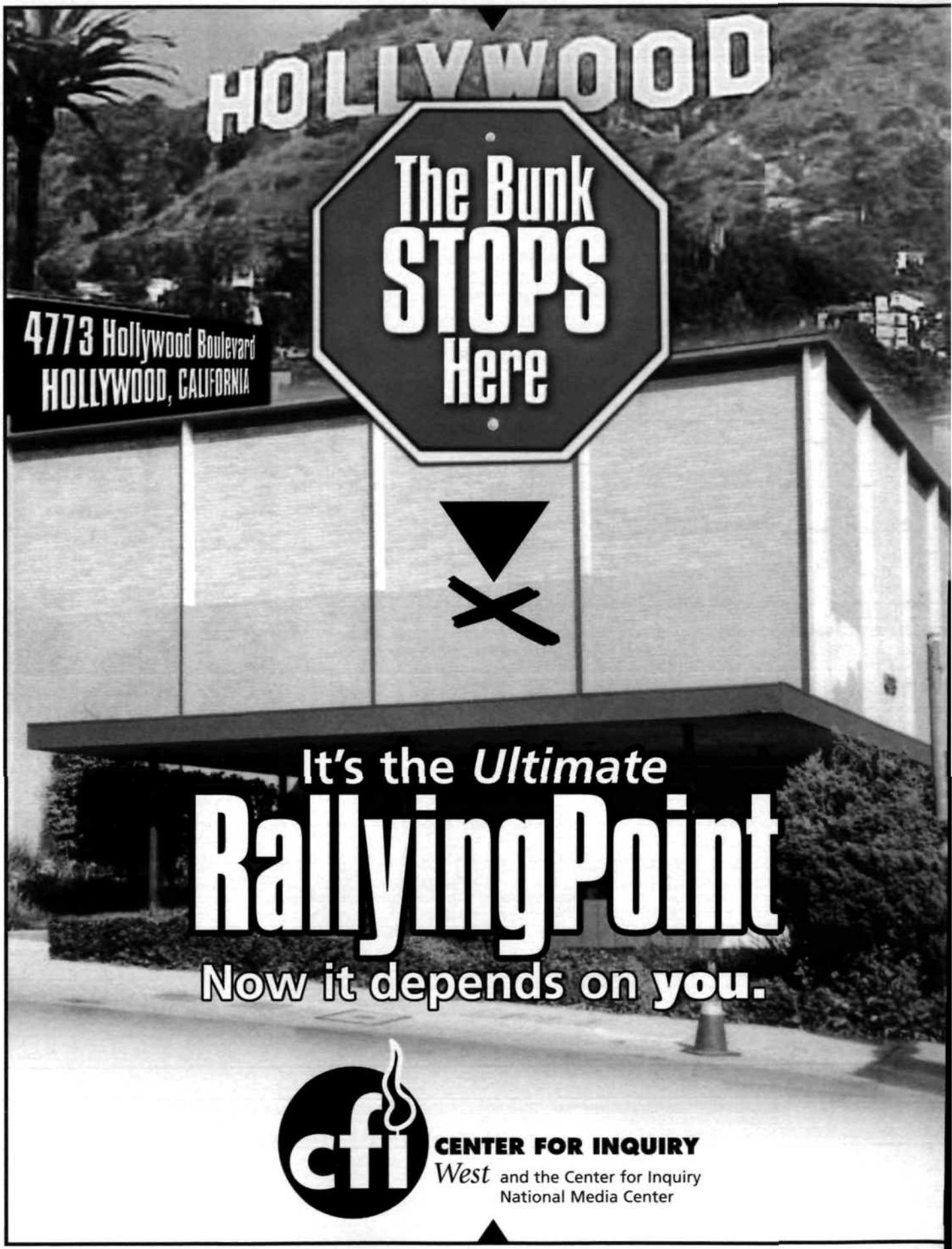


Jan Willem Nienhuys of the Netherlands addresses the conference as Amardeo Sarma moderates the panel.

Left to right: Jiri Grygar (Czech Republic), Amardeo Sarma (Germany), Monique Wonner (France), and Jan Zahradil (Czech Republic) participate on a conference panel.

Finally, some important results of the ECSO board meeting, which always takes place at the occasion of the European conferences, should be mentioned. The long-time chairman of ECSO, Professor Cornelis de Jager, asked to be replaced by a younger person, for, being in his eightieth year, he wishes to reduce his workload. Thus Amardeo Sarma (Germany) was unanimously elected as the new chairman; so was Professor Jiri Grygar (Czech Republic) as vice-chairman. Further board members are Tim Trachet (Belgium), Massimo Polidoro (Italy), Michael Heap (U.K.), and Cornelis de Jager (Netherlands). The Center for Inquiry–Europe in Rossdorf (Germany) will henceforth take over the general administrative and financial business of ECSO. A new directory of the European Council of Skeptical Organizations will be published by the Center in early 2002.

After this successful and well-organized conference in the picturesque city of Prague, the participants now look forward to the next European skeptics congress, which will be organized by ASKE (Association for Skeptical Enquiry, U.K.) and held in London from September 5–7, 2003. □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Some Thoughts About Induction

> Ask a scientist what he conceives the scientific method to be, and he will adopt an expression that is at once solemn and shifty-eyed: solemn, because he feels he ought to declare an opinion; shifty-eyed, because he is wondering how to conceal the fact that he has no opinion to declare.
>
> —Sir Peter Brian Medawar, in *Induction and Intuition in Scientific Thought* (1969)

"Induction" has several meanings. Here I shall confine it to the process by which science, on the basis of intuitive hunches followed by empirical evidence, arrives at laws and theories about how the universe operates. Unlike mathematical and logical deduction, it is never absolutely certain, but when the evidence is overwhelming, a law or theory is often called a fact. For example, the constancy of the speed of light regardless of the observer's motion was originally a cornerstone of Einstein's special theory of relativity. It has now been verified to such a high degree that physicists refer to it as a fact. What was once Darwin's theory of evolution is now regarded as a fact by everybody except religious fundamentalists.

Induction operates in two ways. It either advances a conjecture by what are called confirming instances, or it falsifies a conjecture by contrary or disconfirming evidence. A common example is the hypothesis that all crows are black. Each time a new crow is observed and found to be black the conjecture is increasingly confirmed. But if a crow is found to be not black the conjecture is falsified.

You might suppose that the term "confirming instance" can be precisely defined. Although in most cases it is easily recognized there are many cases where the term becomes extremely fuzzy. The most notorious example, known as Hempel's paradox, was discovered by the German philosopher Carl Gustav Hempel. It goes like this: The statement "All crows are black" is logically equivalent to "No not-black object is a crow." This seems to allow an ornithologist to do research in his living room. He observes, say, a blue vase and notes it is not a crow. This clearly is a confirming instance of "No not-black object is a crow." But if it confirms that statement, does it not also confirm the logically equivalent statement not all crows are black?

The answer is clearly yes if we limit our universe to a small set of black and non-black objects. For example, suppose the "universe" consists of just two shoe boxes on a shelf so high that one can reach into each box but not see into it. A "scientist" is told only that box A contains six cubes, and box B contains six red objects.

The scientist reaches into box A and removes one cube at a time. Each time he gets a black cube it confirms the assertion that all six cubes are black. After he has seen all six has the conjecture been verified? No, because box B may contain a red cube. So, the scientist takes out red objects, one by one. Each time it is seen not to be a cube it surely confirms the statement "No not-black object is a cube," and therefore also confirms the statement that all six cubes are black.

However, in the world of real crows the number of not-black objects is close to infinity. Nevertheless, Hempel argued, the observation of a blue vase or a red apple does indeed confirm "All crows are black," but only to an infinitesimal degree. Other philosophers of science disagree. They maintain that seeing a blue vase adds nothing to the evidence that all crows are black. The debate is still the topic of academic papers. If you care to look into this far-from-settled controversy you will find a lengthy bibliography on pages 191–194 of my *Hexaflexagons and Other Mathematical Diversions* (1988).

Hempel's paradox is not the only example of how fuzzy the term

Martin Gardner's latest book, Martin Gardner's Favorite Poetic Parodies, *was published in October by Prometheus Books. The most recent collection of his* SKEPTICAL INQUIRER *columns (and other material) is* Did Adam and Eve Have Navels? *(W.W. Norton, 2000).*

"confirming instance" can be. I will give only one more instance. (For others, see Wesley Salmon's admirable article, "Confirmation," in *Scientific American*, May 1973.) Consider the conjecture "A person can grow to fifteen feet tall." Now imagine that in some remote jungle a man is discovered who is fourteen-and-a-half feet tall. From one point of view he does not confirm the conjecture because he fails by a half a foot. On the other hand he can be seen as a confirming instance because if a man can grow fourteen-and-a-half feet it becomes much more likely that he could grow another six inches.

How can induction be justified? David Hume considered this question and concluded that induction has no logical justification. No matter how many times the sun rises, there is no *logical* reason why it might not fail to rise tomorrow. The same applies to any given law of nature. For all we know, it could suddenly alter. Today's philosophers of science all agree with Hume. But can induction be justified in some non-logical way? Hans Reichenbach defended it by saying that the only conceivable way we can learn anything about nature is by making inductions from available evidence. This is certainly true, but it's not much of a justification.

David Hume, and later John Stuart Mill, gave what has become the most popular justification. Induction works, they said, because nature is orderly; that is, it is based on mathematical patterns that are assumed to hold throughout the universe and not to change with time. Once this "uniformity of nature," as Mill called it, is granted, it becomes plausible that observing part of a pattern will justify assuming that the pattern will generalize into a law. As Hume and many later philosophers pointed out, this involves circular reasoning. We justify induction by assuming that nature is uniform, but the only way we decide it is uniform is by induction. However, as Max Black and others argued, in this case circular reasoning is not vicious.

Bertrand Russell, in his early years, thought it possible that some day a logical basis for induction could be found. In his later years he abandoned this hope. His last major work, *Human Knowledge, Its Scope and Limits* (1948), reached the same conclusion as Hume and Mill. Here is how he summarized the book in his introduction:

We justify induction by assuming that nature is uniform, but the only way we decide it is uniform is by induction. However, as Max Black and others argued, in this case circular reasoning is not vicious.

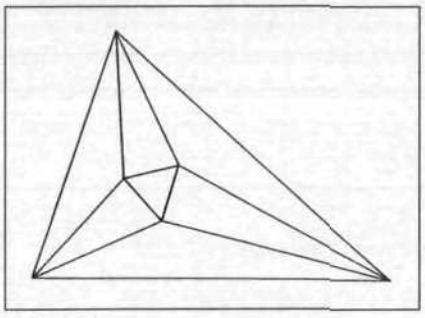
> Inference from a group of events to other events can only be justified if the world has certain characteristics which are not logically necessary. So far as deductive logic can show, any collection of events might be the whole universe; if, then, I am ever to be able to infer events, I must accept principles of inference which lie outside deductive logic. All inference from events to events demands some kind of interconnection between different occurrences. Such interconnection is traditionally asserted in the principle of causality or natural law. It is implied, as we shall find, in whatever limited validity may be assigned to induction by simple enumeration. But the traditional ways of formulating the kind of interconnection that must be postulated are in many ways defective, some being too stringent and some not sufficiently so. To discover the minimum principles required to justify scientific inferences is one of the main purposes of this book.

Richard Feynman, on a *Nova* television interview in 1983, likened the scientist to a man who knows nothing about chess, but is allowed once every day to observe for one minute a small part of a chessboard while a game is in progress. It may take him many weeks to realize that bishops move only along diagonals and rooks move only along orthorgonals. Months later he may think he knows how all the pieces move and capture, but then come surprises. He sees a pawn captured *en passant*, or a king and rook castle. A big surprise is seeing that a player has two queens on the board. It could take the scientist years to learn that a pawn on the eighth row can become a queen, rook, bishop, or knight, or exactly what checkmates and stalemates are.

The main point of the chess analogy is that induction works only on universes that are uniformly patterned. The chess universe is very tiny, restricted to an eight-by-eight checkered square and a small number of pieces and rules. The actual universe is playing a game on a far vaster scale. For all we know the space-time "board" may be infinite in both space and time, and there could be an infinity of rules. But without positing the uniformity of nature, induction would be hopeless. $E=mc^2$ both on Earth and in distant galaxies. All electrons, fortunately, are identical. They may be made of superstrings. If so, what are superstrings made of? Maybe the universe is infinite in both directions.

A number of induction games have been invented that model the process of guessing a general rule by observing part of a pattern. One is the card game called Eleusis, created by Robert Abbott and described in my *Penrose Tiles to Trapdoor Ciphers* (1989). Another induction game called Patterns, played on a board, was invented by Sidney Sackson and described in my book *Mathematical Circus* (1979). An intriguing variant of Eleusis, by mathematician Martin Kruskal, can be found in his 1962 booklet, *Delphi—A Game of Induction.* Efforts are being made here and there to program computers to make inductions when fed statements of evidence, but so far they have not discovered any new laws, though they have rediscovered some old ones.

In his later years Rudolf Carnap wrote a big book titled *Logical Foundations of Probability* in which he defined "degree of confirmation" as a logical relation between a conjecture



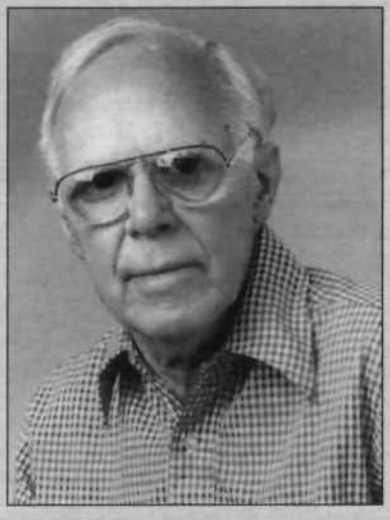
Morley's Theorem

and all relevant evidence. He believed that in the future it would be possible to construct an inductive logic based on a formal language in which an hypothesis and its evidence could be precisely stated. The degree of confirmation could then be expressed by a probability between one and zero, a value that would alter as the evidence altered. Most other philosophers of science, notably Sir Karl Popper, have disagreed. They think it will never be possible to quantify a degree of confirmation. Of course scientists often express a degree of confirmation by giving their subjective estimate. Rival efforts to construct inductive logics have been made by other philosophers, but the efforts are primitive.

It is worth noting that mathematicians often discover a theorem by experimenting with numbers or diagrams in a way that closely resembles the way scientists induce a physical law. For example, Frank Morley, father of the writer Christopher Morley, was surprised one day to find that if he trisected the angles of an arbitrary triangle, three intersection points were the corners of an equilateral triangle. Each time he experimented with a different triangle he got the same beautiful result. Eventually he proved what is called "Morley's theorem." The point is that every time a new triangle produced the same little equilateral triangle it was a confirming instance of Morley's conjecture.

There are many other problems involving induction that are covered in endless books and papers. I close with what seems to me the deepest of all unanswered questions about induction. What role does simplicity play in adding to the degree of confirmation of a law or theory? Given a choice between two conjectures for which the known evidence is equal, it seems that the simpler of the two is more likely to be fruitful. Is this always the case? Alfred North Whitehead once advised, "Seek simplicity but distrust it." And can a conjecture's simplicity be quantified? Is there a way to measure simplicity? So far no one has come close to answering these questions.

The problem is more than academic. Suppose a laboratory is considering two competing theories for which the evidence is equal. To test each theory would involve equipment costing a million dollars per theory. But how the simplicity could be determined is not clear, and no one knows why the simpler theory is more likely to be true. □



Note to Readers

With this column, and at the age of 87, Martin Gardner has asked to be relieved of his regular column-writing duties for the SKEPTICAL INQUIRER. He may continue to contribute occasional articles and book reviews. Gardner, a CSICOP founding Fellow and member of both its Executive Council and the SKEPTICAL INQUIRER Editorial Board since the beginning (1976), has contributed a Notes of a Fringe-Watcher column (originally titled Notes of Psi-Watcher) to every issue of the SKEPTICAL INQUIRER since Summer 1983. He began the column after retiring as the *Scientific American*'s long-time "Mathematical Games" columnist. Gardner's classic book about pseudoscientists, *Fads and Fallacies in the Name of Science*, was first published almost a half-century ago and is still available in Dover editions. Since then he has published numerous "sequels," including *Science: Good, Bad, and Bogus* (1981) and four collections of his SI columns (and other writings): *The New Age: Notes of a Fringe-Watcher* (1988), *On the Wild Side* (1992), *Weird Water and Fuzzy Logic* (1996), and *Did Adam and Eve Have Navels?* (2000). (For more about him read "A Mind at Play: An Interview with Martin Gardner," SI, March/April 1998.) We cherish Martin's long and close association with SI, and hope it continues for years to come.

Voodoo in New Orleans

New Orleans has been declared America's most haunted city (Klein 1999, 104), and tour guides—following the imaginative lead of Anne Rice—have attempted to overlay it with bogus legends of vampires and other spine-tingling notions. But perhaps the city's oldest and most profound occult traditions are those involving the mysterious practices of voodoo. During a southern speaking tour I was able to set aside a few days to explore the New Orleans museums, shops, temples, and tombs that relate to this distinctive admixture of religion and magic, commerce and controversy.

Voodoo

Voodoo—or voudou—is the Haitian folk religion. It consists of various African magical beliefs and rites that have become mixed with Catholic elements. It began with the arrival of slaves in the New World, most of them from the western, "Slave Coast" area of Africa, notably from Dahomey, now Benin, and Nigeria. In Benin's Fon language, *vodun* means "spirit," an invisible, mysterious force that can intervene in human affairs (Hurbon 1995, 13; Métraux 1972, 25, 359; Bourguignon 1993).

According to one writer, "The Blacks suffered under merciless circumstances—their property and their family and social structures all torn to shreds; they had nothing left—except their Gods to whom they clung tenaciously." In Haiti and elsewhere, there was an attempt to strip them even of that, their "heathen" beliefs being rigorously suppressed. However, the slaves "worshiped many of their Gods unbeknownst to the priests, under the guise of worshipping Catholic saints" (Antippas 1988, 2).

Voodoo's African elements include worship of *loa* (supernatural entities) and the ancestral dead, together with the use of drums and dancing, during which *loa* may possess the faithful. Catholic elements include prayers such as the Hail Mary and the Lord's Prayer, as well as baptism, making the sign of the cross, and the use of candles, bells, crosses, and the images of saints. Many of the *loa* are equated with specific saints; for example Damballah, the Dahomean snake deity, is identified with St. Patrick who, having legendarily expelled all snakes from Ireland, is frequently depicted stamping on snakes or brandishing his staff at them (Bourguignon 1993).

Voodoo spread from Haiti to New Orleans in the wake of the Haitian slave revolt (1791–1804). The refugee plantation owners fled with their slave retinues to Louisiana where slaves had previously toiled under such repressive circumstances that their African religion "had all but withered." However, oppression lessened somewhat with American rule, following the Louisiana Purchase of 1803, and—with the influx of thousands of voodoo practitioners—soon "New Orleans began to hear the beat of the drum" (Antippas 1988, 14).

Voodoo Queen

Voodoo in New Orleans can scarcely be separated from its dominant figure, Marie Laveau, about whom many legends swirl. According to one source (Hauck 1996):

> She led voodoo dances in Congo Square and sold charms and potions from her home in the 1830s. Sixty years later she was still holding ceremonies and looked as young as she did when she started. Her rites at St. John's Bayou on the banks of Lake Pon[t]chartrain resembled a scene from hell, with bonfires, naked dancing, orgies, and animal sacrifices. She had a strange power over police and judges and succeeded in saving several criminals from hanging.

Writer Charles Gandolfo (1992), author of *Marie Laveau of New Orleans*, states: "Some believe that Marie had a mysterious birth, in the sense that she may have come from the spirits or as an envoy from the Saints." On the other hand a plaque on her supposed tomb, placed by the Catholic Church, refers to her as "this notorious 'voodoo queen.'"

Who was the real Marie Laveau? She began life as the illegitimate daughter of

Joe Nickell is CSICOP's Senior Research Fellow and author of numerous investigative books. His latest is Real-Life X-Files *(2001).*

Figure 1. Tableau, "Marie Laveau's Voodoo Dancers," in the Musée Conti wax museum. Photos by Joe Nickell.

a rich Creole plantation owner, Charles Laveaux, and his Haitian slave mistress. Sources conflict but Marie may have been born in New Orleans in 1794. In 1819 she wed Jacques Paris who, like her, was a free person of color, but she was soon abandoned or widowed. About 1826, she began a second, common-law marriage to Christophe de Glapion, another free person of color, with whom she would have fifteen children.

Marie was introduced to voodoo by various "voodoo doctors," practitioners of a popularized voodoo that emphasized curative and occult magic and seemed to have a decidedly commercial aspect. Her own practice began when she teamed up with a "heavily tattooed Voodoo doctor"—known variously as Doctor John, Bayou John, John Bayou, etc.—who was "the first commercial Voodooist in new Orleans to whip up potions and gris-gris for a price" (Gandolfo 1992, 11). Gris-gris or "juju" refers to magic charms or spells, often conjuring bags containing such items as bones, herbs, charms, snake skin, etc., tied up in a piece of cloth (Antippas 1988, 16). Doctor John reportedly confessed to friends that his magic was mere humbuggery. "He had been known to laugh," writes Robert Tallant in *Voodoo in New Orleans* (1946, 39), "when he told of selling a gullible white woman a small jar of starch and water for five dollars."

In time Marie decided to seek her own fortune. Working as a hairdresser, which put her in contact with New Orleans' social elite, she soon developed a clientele to whom she dispensed potions, gris-gris bags, voodoo dolls, and other magical items. She now sought supremacy over her rivals, some fifteen "voodoo queens" in various neighborhoods. According to a biographer (Gandolfo 1992, 17):

> Marie began her take-over process by disposing of her rival queens. . . . If her rituals or gris-gris didn't work, Marie (who was a statuesque woman, to say the least) met them in the street and physically beat them. This war for supremacy lasted several years until, one by one, all of the former queens, under a pledge, agreed to be sub-queens. If they refused, she ran them out of town.

By age thirty-five Marie Laveau had become New Orleans's most powerful voodoo queen—then or since. She won the approval of the local priest by encouraging her followers to attend mass. While she charged the rich abundantly, she reportedly gave to the needy and administered to the suffering. Her most visible activities, however, were her public rituals. By municipal decree (from 1817) slaves were only permitted to dance publicly at a site called Congo Square. "These public displays of Voodoo ceremonies, however, revealed nothing of the real religion and became merely entertainment for the curious whites" (Antippas 1988, 14–15). More "secret" rituals—including fertility rituals—took place elsewhere, notably on the shore of Lake Pontchartrain.

It is difficult at this remove to assess just how much of Marie's rituals was authentic voodoo practice and how much was due to her "incredible imagination and an obsession for the extreme." She staged rituals that were "simulated orgies." Men and women danced in abandonment after drinking rum and seeming to become possessed by various *loas* (figure 1). Seated on her throne, Marie directed the action when she was not actually participating. She kept a large snake called Le Grand Zombi that she would dance with in veneration of Damballah, shaking a gourd rattle to summon that snake deity and repeating over and over, "Damballah, ye-ye-ye!"

Once a year Marie presided over the ritual of St. John's Eve. It began at dusk on June 23 and ended at dawn on the next day, St. John's day. Hundreds attended, including reporters and curious onlookers, each of whom was charged a fee. Drum beating, bonfires, animal sacrifice, and other elements—including nude women dancing seductively—characterized the extended ritual. Offerings were made to the appropriate *loas* for protection, including safeguarding children and others from the *Cajun bogeyman, Loup-Garou*, a werewolf that supposedly fed on the blood of victims (Gandolfo 1992, 18–23).

Magic or Myth?

Claims regarding Marie Laveau's alleged powers persist. She represented herself as a seer and used fortune-telling techniques such as palmistry (Gandolfo 1992, 26). There is no evidence that Marie's clairvoyant abilities were any more successful than those of any other fortuneteller. We know that people attest to the accuracy of a reading because they do not understand the clever techniques involved, like "cold reading." So called because it is accomplished without any foreknowledge, this is an artful method of fishing for information from the sitter while convincing

him or her that it comes from a mystical source (Hyman 1977).

Actually, many of Marie's readings may not have been so "cold" after all. Far from lacking prior information about her clients, she reputedly used her position as a hairdresser for gossip collecting, discovering "that her women clients would talk to her about anything and everything and would divulge some of their most personal secrets to her" (Gandolfo 1992, 12). She also reputedly "developed a chain of household informants in most of the prominent homes" (Antippas 1988, 16).

Doubtless such intelligence gathering would be helpful to a fortune-telling enterprise (just as "mediumistic espionage" was utilized by later spiritualists [Keene 1976, 27]). It could also be beneficial to a business of dispensing charms, like Marie's:

> Most of her work for the ladies involved love predicaments. Marie knew the personal secrets of judges, priests, lawyers, doctors, ship captains, architects, military officers, politicians, and most of New Orleans's other leading citizens. She used her knowledge of their indiscretions and blackmailed them into doing whatever she wanted. She was then financially reimbursed by her elite female clients. Most of the time, this was how her love potions and gris-gris worked, which is apparently 100% of the time (Gandolfo 1992, 12).

Such tactics may help explain the claim, mentioned earlier, that Marie "had a strange power over police and judges and succeeded in saving several criminals from hanging" (Hauck 1996). But we should beware of taking such claims too seriously. When we seek to learn the facts, we soon realize we have entered the realm of folklore. There are, for example, rather conflicting versions of one case, ca. 1830, in which an unidentified young man was charged with "a crime" (rape, according to one source) and at the request of his father Marie performed certain rituals. Supposedly the case was either dismissed or the young man acquitted, and Marie was rewarded with a cottage on Rue St. Ann. However, as one writer concedes, "No one is sure how Marie actually won the case. . . ." Therefore, of course, there is no evidence that she did (Gandolfo 1992, 14–15; cf. Tallant 1946, 58; Martinez 1956, 17–19).

Legends of Marie's beneficent aspect are rivaled by those of her sinister one. A story in this regard involves the alleged hex of a New Orleans businessman, J. B. Langrast, in the 1850s. Langrast supposedly provoked Marie's ire by publicly denouncing her and accusing her of everything from robbery to murder. Soon, gris-gris in the form of roosters' heads began to appear on his doorstep. As a consequence, Langrast reportedly grew increasingly upset and eventually fled New Orleans (Nardo and Belgum 1991, 89–92).

I have traced the Langrast story to a 1956 book of Mississippi folktales which describes the "businessman" as a junk dealer and bigamist (Martinez 1956, 78–83). Such a man might have various reasons for leaving town. Claims that Marie Laveau invoked a *loa* to curse Langrast with insanity are invalidated by a complete lack of proof that he ever became insane. In fact his alleged flight could easily be attributed to simple fear, the belief that "Marie Laveau's followers might kill him if he stayed" (Nardo and Belgum 1991, 90–91).

Marie II

Among the most fabulous legends about Marie Laveau is an often-repeated one alleging "her perpetual youth" (Hauck 1996). According to a segment of "America's Haunted Houses" (1998) which aired on the Discovery Channel, Marie was "said to be over 100 years old when she died and as beautiful as ever." Moreover, "There were some unexplained and mysterious sightings of the great Voodoo Queen even after her death," writes Gandolfo (1992, 29). "People would swear on a stack of bibles that they saw Marie Laveau herself." Indeed, he adds, "A number of people say they were at a ritual in the summer of 1919 given by the Great Queen."

The solution to this enigma is the fact that, according to Tallant (1946, 52), there were "at least two Marie Laveaus." The first Marie, the subject of our previous discussions, died June 15, 1881. Her obituaries say she was then ninety-eight ("Marie Lavaux" 1881; "Death" 1881). One of the same obituaries ("Death" 1881) states more credibly that she had been twenty-five when she wed, consistent with her having been born in 1794, as most sources now agree, and thus about eighty-seven when she died. Indeed, the doctor who attended Marie at the end publicly stated his doubts that she was as old as her family had claimed, and he judged her age to be in the late eighties (Tallant 1946, 117).

Whatever her actual age, far from appearing to be a figure of eternal youth, Marie Laveau spent her last years "old and shrunken," stripped of her memory, and lying in a back room of her cottage (Tallant 1946, 88, 115). In her stead was her daughter, Marie Laveau II. The younger Marie gradually took over her mother's business activities, which included running a house on Lake Pontchartrain where rich Creole men could have "appointments" with young mulatto girls (Tallant 1946, 65–66). She died in 1897.

The claim that Marie Laveau was active in 1919 is thought to have been based on a third Marie, possibly a granddaughter (Gandolfo 1992, 29), or another voodoo queen with whom she was confused.

In carrying on her mother's work, Marie II had business cards printed, billing her not as a voodooienne but as a "Healer." According to Tallant (1946, 93):

> The Laveau ways of performing homeopathic magic were endless. Sick people were often brought to the house to receive the benefit of a cure by Marie II. A person bitten by a snake was told to get another live snake of any sort, cut its head off "while it was angry" and to tie this head to the wound. This was to be left attached until sunrise of the following day. Sometimes her practices contained an element of medical truth, embracing the use of roots and herbs that contained genuine curative elements. For sprains and swellings she used hot water containing Epsom salts and rubbed the injured parts with whiskey, chanting prayers and burning candles at the same time, of course. For other ailments she

Figure 2. Authentic "working" altar in New Orleans' Voodoo Spiritual Temple. Candles, religious effigies, bottles of rum (as offerings), and other elements are typical.

administered castor oil, to the accompaniment of incantations and prayer.

Like other occult healers, Marie obviously took advantage not only of the occasional "element of medical truth" but also other factors, including the body's own natural healing mechanisms and the powerful effects of suggestion.

Voodoo Today

Current voodoo practice in New Orleans is a mere shadow of what it was in its heyday. Although an estimated fifteen percent of the city's population supposedly still practices voodoo, it has largely been subsumed into Catholicism, which remains the dominant religion. It has also been influenced by spiritualist, wiccan, and other occult and New Age beliefs (Gandolfo n.d.). The most visible aspects of voodoo today are tours and attractions in the area of the Vieux Carré (or "Old Square"), popularly called the French Quarter. Laid out in 1721, it is the oldest area of the city.

There, souvenir shops sell that most stereotypical of items associated with voodoo, the voodoo doll. Although in the days of Marie Laveau one might occasionally encounter "a little wax doll stuck with pins," the fact is, according to Tallant (1946, 93), "despite their frequency in fiction about Voodoo, dolls were rarely used in the practices." Nevertheless, they are today everywhere. One can at least shun the made-in-China souvenirs for the local variety sold at Marie Laveau's House of Voodoo, Rev. Zombie's Voodoo Shop, and the New Orleans Historic Voodoo Museum. The latter attraction is well worth seeing for its display of historic artifacts relating to voodoo and its practitioners, including Marie Laveau.

The museum promotes voodoo—including its commercial, tourist aspect—through various offerings, including annual rituals on St. John's Eve and Halloween, and for-hire performances offered as party entertainment. Walking tours of voodoo-related sites in the Vieux Carré are also available daily.

Tour groups may routinely visit the Voodoo Spiritual Temple on Rampart Street at the edge of the Vieux Carré. I had enlisted a professional guide and was able to gain an audience with Priestess Miriam, perhaps today's premier voodoo queen. At the end of an interesting visit, she waived the prohibition against photographs and permitted me to document some of the authentic voodoo altars of this religious and cultural center (figure 2). These are "working" altars, meaning they are used in rituals and are modified to invoke and propitiate various spirits.

Tours also take visitors to the reputed tomb of Marie Laveau where they may hope to have a wish granted or glimpse her ghost which allegedly haunts the site. (The secrets of Marie's tomb will be explored in a future column in *Skeptical Briefs*, where additional "Investigative Files" also appear.) Although voodoo has declined from the early days, when Marie held New Orleans under her spell, her influence nevertheless continues.

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Myths of Murder and Multiple Regression

Econometric modeling has failed as a method of resolving controversies about issues such as gun control, capital punishment, and homicide rates. The continued use of models that have no demonstrated predictive ability is a form of junk science.

TED GOERTZEL

Do you believe that every time a prisoner is executed in the United States, eight future murders are deterred? Do you believe that a one percent increase in the number of citizens licensed to carry concealed weapons causes a 3.3 percent *decrease* in the state's murder rate? Do you believe that 10 to 20 percent of the decline in crime in the 1990s was caused by an increase in abortions in the 1970s? Or that the murder rate would have increased by 250 percent since 1974 if the United States had not built so many new prisons?

If you were misled by any of these studies, you may have fallen for a pernicious form of junk science: the use of mathematical models with no demonstrated predictive capability

to draw policy conclusions. These studies are superficially impressive. Written by reputable social scientists from prestigious institutions, they often appear in peer-reviewed scientific journals. Filled with complex statistical calculations, they give precise numerical "facts" that can be used as debaters' points in policy arguments. But these "facts" are will o' the wisps. Before the ink is dry on one study, another appears with completely different "facts." Despite their scientific appearance, these models do not meet the fundamental criterion for a useful mathematical model: the ability to make predictions that are better than random chance.

Although economists are the leading practitioners of this arcane art, sociologists, criminologists, and other social scientists have versions of it as well. It is known by various names, including "econometric modeling," "structural equation modeling," and "path analysis." All of these are ways of using the correlations between variables to make causal inferences. The problem with this, as anyone who has had a course in statistics knows, is that correlation is not causation. Correlations between two variables are often spurious because they are caused by some third variable. Econometric modelers try to overcome this problem by including all the relevant variables in their analyses, using a statistical technique called "multiple regression." If one had perfect measures of all the causal variables, this would work. But the data are never good enough. Repeated efforts to use multiple regression to achieve definitive answers to public policy questions have failed.

But many social scientists are reluctant to admit failure. They have devoted years to learning and teaching regression modeling, and they continue to use regression to make causal arguments that are not justified by their data. I call these arguments the myths of multiple regression, and I would like to use four studies of murder rates as examples.

Myth One: More Guns, Less Crime

John Lott, an economist at Yale University, used an econometric model to argue that "allowing citizens to carry concealed weapons deters violent crimes, without increasing accidental deaths." Lott's analysis involved "shall issue" laws that require local authorities to issue a concealed weapons permit to any law-abiding citizen who applies for one. Lott estimated that each one percent increase in gun ownership in a population causes a 3.3 percent *decrease* in homicide rates. Lott and his co-author David Mustard posted the first version of their study on the Internet in 1997 and tens of thousands of people downloaded it. It was the subject of policy forums, newspaper columns, and often quite sophisticated debates on the World Wide Web. In a book with the catchy title *More Guns, Less Crime*, Lott taunted his critics, accusing them of putting ideology ahead of science.

Lott's work is an example of statistical one-upmanship. He has more data and a more complex analysis than anyone else studying the topic. He demands that anyone who wants to challenge his arguments become immersed in a very complex statistical debate, based on computations so difficult that they cannot be done with ordinary desktop computers. He challenges anyone who disagrees with him to download his data set and redo his calculations, but most social scientists do not think it worth their while to replicate studies using methods that have repeatedly failed. Most gun control researchers simply brushed off Lott and Mustard's claims and went on with their work. Two highly respected criminal justice researchers, Frank Zimring and Gordon Hawkins (1997), wrote an article explaining that:

> just as Messrs. Lott and Mustard can, with one model of the determinants of homicide, produce statistical residuals suggesting that 'shall issue' laws reduce homicide, we expect that a determined econometrician can produce a treatment of the same historical periods with different models and opposite effects. Econometric modeling is a double-edged sword in its capacity to facilitate statistical findings to warm the hearts of true believers of any stripe.

Zimring and Hawkins were right. Within a year, two determined econometricians, Dan Black and Daniel Nagin (1998), published a study showing that if they changed the statistical model a little bit, or applied it to different segments of the data, Lott and Mustard's findings disappeared. Black and Nagin found that when Florida was removed from the sample there was "no detectable impact of the right-to-carry laws on the rate of murder and rape." They concluded that "inference based on the Lott and Mustard model is inappropriate, and their results cannot be used responsibly to formulate public policy."

John Lott, however, disputed their analysis and continued to promote his own. Lott had collected data for each of America's 50,056 counties for each year from 1977 to 1992. The problem with this is that America's counties vary tremendously in size and social characteristics. A few large ones, containing major cities, account for a very large percentage of the murders in the United States. As it happens, none of these very large counties have "shall issue" gun control laws. This means that Lott's massive data set was simply unsuitable for his task. He had no variation in his key causal variable—"shall issue" laws—in the places where most murders occurred.

He did not mention this limitation in his book or articles. When I discovered the lack of "shall issue" laws in the major cities in my own examination of his data, I asked him about it. He shrugged it off, saying that he had "controlled" for population size in his analysis. But introducing a statistical control in the mathematical analysis did not make up for the fact that he simply had no data for the major cities where the homicide problem was most acute.

It took me some time to find this problem in his data, since I was not familiar with the gun control issue. But Zimring and Hawkins zeroed in on it immediately because they knew that "shall issue" laws were instituted in states where the National Rifle Association was powerful, largely in the South, the West and in rural regions. These were states that already had few restrictions on guns. They observed that this legislative history frustrates "our capacity to compare trends in 'shall issue' states with trends in other states. Because the states that changed legislation are different in location and constitution from

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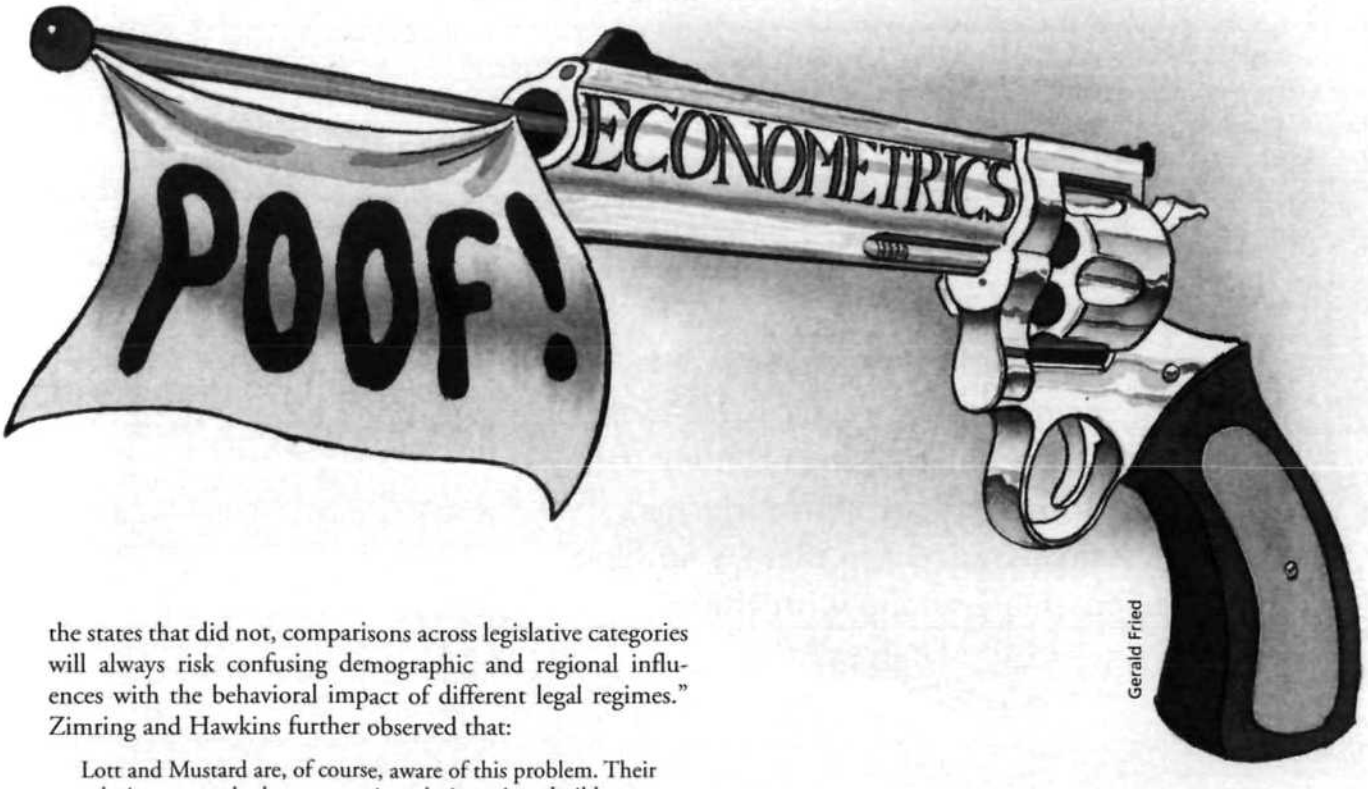

Gerald Fried

the states that did not, comparisons across legislative categories will always risk confusing demographic and regional influences with the behavioral impact of different legal regimes." Zimring and Hawkins further observed that:

> Lott and Mustard are, of course, aware of this problem. Their solution, a standard econometric technique, is to build a statistical model that will control for all the differences between Idaho and New York City that influence homicide and crime rates, other than the "shall issue" laws. If one can "specify" the major influences on homicide, rape, burglary, and auto theft in our model, then we can eliminate the influence of these factors on the different trends. Lott and Mustard build models that estimate the effects of demographic data, economic data, and criminal punishment on various offenses. These models are the ultimate in statistical home cooking in that they are created for this data set by these authors and only tested on the data that will be used in the evaluation of the *right-to-carry impacts.*

Lott and Mustard were comparing trends in Idaho and West Virginia and Mississippi with trends in Washington, D.C. and New York City. What actually happened was that there was an explosion of crack-related homicides in major eastern cities in the 1980s and early 1990s. Lott's whole argument came down to a claim that the largely rural and western "shall issue" states were spared the crack-related homicide epidemic because of their "shall issue" laws. This would never have been taken seriously if it had not been obscured by a maze of equations.

Myth Two: Imprisoning More People Cuts Crime

The Lott and Mustard case was exceptional only in the amount of public attention it received. It is quite common, even typical, for rival studies to be published using econometric methods to reach opposite conclusions about the same issue. Often there is nothing demonstrably wrong with either of the analyses. They simply use slightly different data sets or different techniques to achieve different results. It seems as if regression modelers can achieve any result they want without violating the rules of regression analysis in any way. In one exceptionally frank statement of frustration with this state of affairs, two highly respected criminologists, Thomas Marvell and Carlisle Moody (1997, 221), reported on the reception of a study they did of the effect of imprisonment on homicide rates. They reported that they:

> widely circulated [their] findings, along with the data used, to colleagues who specialize in quantitative analysis. The most frequent response is that they refuse to believe the results no matter how good the statistical analysis. Behind that contention is the notion, often discussed informally but seldom published, that social scientists can obtain any result desired by manipulating the procedures used. In fact, the wide variety of estimates concerning the impact of prison populations is taken as good evidence of the malleability of research. The implication, even among many who regularly publish quantitative studies, is that no matter how thorough the analysis, results are not credible unless they conform with prior expectations. A research discipline cannot succeed in such a framework.

To their great merit, Marvell and Moody frankly acknowledged the problems with multiple regression, and made some suggestions for improvement. Unfortunately, some econometricians become so immersed in their models that they lose track of how arbitrary they are. They come to believe that their models are more real, more valid, than the messy, recalcitrant, "uncontrolled" reality they purport to explain.

Myth Three: Executing People Cuts Crime

In 1975 *The American Economic Review* published an article by

a leading economist, Isaac Ehrlich of the University of Michigan, who estimated that each execution deterred eight homicides. Before Ehrlich, the best known specialist on the effectiveness of capital punishment was Thorsten Sellen, who had used a much simpler method of analysis. Sellen prepared graphs comparing trends in different states. He found little or no difference between states with or without the death penalty, so he concluded that the death penalty made no difference. Ehrlich, in an act of statistical one-upmanship, claimed that his analysis was more valid because it controlled for all the factors that influence homicide rates.

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Even before it was published, Ehrlich's work was cited by the Solicitor General of the United States in an *amicus curiae* brief filed with the United States Supreme Court in defense of the death penalty. Fortunately, the Court decided not to rely upon Ehrlich's evidence because it had not been confirmed by other researchers. This was wise, because within a year or two other researchers published equally sophisticated econometric analyses showing that the death penalty had no deterrent effect.

The controversy over Ehrlich's work was so important that the National Research Council convened a blue ribbon panel of experts to review it. After a very thorough review, the panel decided that the problem was not just with Ehrlich's model, but with the idea of using econometric methods to resolve controversies over criminal justice policies. They (Manski 1978, 422) concluded that:

> because the data likely to be available for such analysis have limitations and because criminal behavior can be so complex, the emergence of a definitive behavioral study lying to rest all controversy about the behavioral effects of deterrence policies should not be expected.

Most experts now believe that Sellen was right, that capital punishment has no demonstrable effect on murder rates. But Ehrlich has not been persuaded. He is now a lonely true believer in the validity of his model. In a recent interview (Bonner and Fessendren 2000) he insisted "if variations like unemployment, income inequality, likelihood of apprehension, and willingness to use the death penalty are accounted for, the death penalty shows a significant deterring effect."

Myth Four: Legalized Abortion Caused the Crime Drop in the 1990s

In 1999, John Donohue and Steven Levitt released a study with a novel explanation of the sharp decline in murder rates in the 1990s. They argued that the legalization of abortion by the U.S. Supreme Court in 1973 caused a decrease in the birth of unwanted children, a disproportionate number of whom would have grown up to be criminals. The problem with this argument is that the legalization of abortion was a one-time historical event, and one-time events do not provide enough data for a valid regression analysis. It is true that abortion was legalized earlier in some states than others, and Donohue and Levitt make use of this fact. But all these states were going through the same historical processes, and many other things were happening in the same historical period that affected murder rates. A valid regression analysis would have to capture all of these things, and test them under a wide range of variation. The existing data do not permit that, so the results of a regression analysis will vary depending on which data are selected for analysis.

In this case, Donohue and Levitt chose to focus on change over a twelve-year time span, ignoring fluctuations within those years. By doing this, as James Fox (2000, 303) pointed out, "they missed most of the shifts in crime during this period—the upward trend during the late 1980s crack era and the downward correction in the post-crack years. This is something like studying the effects of moon phases on ocean tides but only recording data for periods of low tide."

When I was writing this article, I included a sentence stating "soon another regression analyst will probably reanalyze the same data and reach different conclusions." A few days later, my wife handed me a newspaper story about just such a study. The author was none other than John Lott of Yale, together with John Whitley of the University of Adelaide. They crunched the same numbers and concluded that "legalizing abortion increased murder rates by around about 0.5 to 7 percent" (Lott and Whitely 2001).

Why such markedly different results? Each set of authors simply selected a different way to model an inadequate body of data. Econometrics cannot make a valid general law out of the historical fact that abortion was legalized in the 1970s and crime went down in the 1990s. We would need at least a few dozen such historical experiences for a valid statistical test.

Conclusions

The acid test in statistical modeling is prediction. Prediction does not have to be perfect. If a model can predict significantly better than random guessing, it is useful. For example, if a model could predict stock prices even slightly better than random guessing, it would make its owners very wealthy. So a great deal of effort has gone into testing and evaluating models of stock prices. Unfortunately, researchers who use econometric techniques to evaluate social policies very seldom

subject their models to predictive tests. Their excuse is that it takes too long for the outcomes to be known. You don't get new data on poverty, abortion, or homicide every few minutes as you do with stock prices. But researchers can do predictive testing in other ways. They can develop a model using data from one jurisdiction or time period, then use it to predict data from other times or places. But most researchers simply do not do this, or if they do the models fail and the results are never published (the "filedrawer problem").

The journals that publish econometric studies of public policy issues often do not require predictive testing, which shows that the editors and reviewers have low expectations for their fields. So researchers take data for a fixed period of time and keep fine tuning and adjusting their model until they can "explain" trends *that have already happened.* There are always a number of ways to do this, and with modern computers it is not terribly hard to keep trying until you find something that fits. At that point, the researcher stops, writes up the findings, and sends the paper off for publication. Later, another researcher may adjust the model to obtain a different result. This fills the pages of scholarly journals, and everybody pretends not to notice that little or no progress is being made. But we are no closer to having a valid econometric model of murder rates today than we were when Isaac Ehrlich published the first model in 1975.

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The scientific community does not have good procedures for acknowledging the failure of a widely used research method. Methods that are entrenched in graduate programs at leading universities and published in prestigious journals tend to be perpetuated. Many laymen assume that if a study has been published in a peer-reviewed journal, it is valid. The cases we have examined show that this is not always so. Peer review assures that established practices have been followed, but it is of little help when those practices themselves are faulty.

In 1991, David Freedman, a distinguished sociologist at the University of California at Berkeley and the author of textbooks on quantitative research methods, shook the foundations of regression modeling when he frankly stated, "I do not think that regression can carry much of the burden in a causal argument. Nor do regression equations, by themselves, give much help in controlling for confounding variables" (Freedman 1991, 292). Freedman's article provoked a number of strong reactions. Richard Berk (1991, 315) observed that Freedman's argument "will be very difficult for most quantitative sociologists to accept. It goes to the heart of their empirical enterprise and in so doing, puts entire professional careers in jeopardy."

Faced with critics who want some proof that they can predict trends, regression modelers often fall back on statistical one-upmanship. They make arguments so complex that only other highly trained regression analysts can understand, let alone refute, them. Often this technique works. Potential critics simply give up in frustration. *The Philadelphia Inquirer*'s David Boldt (1999), after hearing John Lott speak on concealed weapons and homicide rates, and checking with other experts, lamented that "trying to sort out the academic arguments is almost a fool's errand. You can drown in disputes over t-statistics, dummy variables, and 'Poisson' vs. 'least squares' data analysis methods."

Boldt was correct to suspect that he was being lured into a fool's mission. There are, in fact, no important findings in sociology or criminology that cannot be communicated to journalists and policy makers who lack graduate degrees in econometrics. It is time to admit that the emperor has no clothes. When presented with an econometric model, consumers should insist on evidence that it can predict trends in data *other than the data used to create it.* Models that fail this test are junk science, no matter how complex the analysis.

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Education, Scientific Knowledge, and Belief in the Paranormal

Education may not be the antidote to paranormal thinking that some observers imagine. Even scientific knowledge and scientific reasoning correlate inconsistently with paranormalism. Here's a new look at the relationship between these two seemingly contradictory dimensions.

ERICH GOODE

The late Carl Sagan informed us that science is "a candle in the dark." He exhorted the educational system to teach its students the fundamentals of science. Over time, he feared, pseudoscience and superstition will become increasingly appealing. "Darkness gathers," he declared ominously. "The demons begin to stir" (Sagan 1995, 27). Only a sound scientific education, Sagan argued, can slay those demons. Jon Miller agrees. His surveys, he concludes, demonstrate a strong negative correlation between education and paranormal belief: The lower the level of the respondent's education, the higher the likelihood of his or her acceptance of each paranormal belief in his surveys. Miller pins his hopes on the educational system to stamp out the

acceptance of such "superstition and pseudoscience" as astrology, belief in lucky numbers, and creationism. Miller dubs the uneducated "the scientific illiterate." His claim is that "For the 25 million Americans who do not have a high school diploma, the world is a strange, hostile, and somewhat dangerous place" (Miller 1987, 30). Hence, the appeal of paranormalism.

Sagan and Miller offer what might be referred to as the positivistic or *enlightenment* view of the education-paranormal connection. Education is seen as antithetical to paranormal (or "pseudoscientific") belief. In effect, education, especially in scientific subjects, *destroys* paranormalism; education is the enemy of pseudoscience. I define *paranormalism* as the belief in any power or force which the overwhelming majority of scientists argue violates a basic scientific rule, principle, or law. Hence, by this definition, astrology, belief in lucky numbers, and creationism are paranormal beliefs—as is belief in ghosts; direct, interactive communication with the dead; psychokinesis; ESP; that UFOs are "something real"; alien abductions; angels; the devil; pyramid power; extra-mechanical levitation; and living past lives. Clearly, since science education refutes such misconceptions, the more of it we have, the less we believe in them.

My hypothesis is a bit different from the "enlightenment" position. I propose that the frequently stated argument that education is an antidote to paranormal beliefs is at least partly erroneous. I suggest that paranormal thinking is made up of a diversity of strands, some of which are discouraged with increased levels of education and some of which are not. I further suggest that the human capacity to compartmentalize categories of thinking is sufficiently great as to permit simultaneous belief in assertions that are contradictory. Many individuals, in fact, accept the truth of paranormal assertions alongside scientific principles that logically and factually contradict them.

I suggest that, instead of a simple, unambiguous negative relationship between education and scientific knowledge on the one hand and paranormalism on the other, there are different dimensions of paranormalism, each with its own special relationship to education and scientific knowledge. I suggest further that the notion that paranormalism violates the laws of nature is an emic concept among scientists—an idea supported by the lore that is accepted within the scientific community and largely alien to the general public.

I make use of two data sources. The first is the many public opinion surveys conducted by a variety of polling organizations whose data are available to interested parties from the Roper Center. In addition, I conducted a small survey among the students in several classes at a large Eastern state university, asking the respondents, among other matters, about their acceptance of paranormal beliefs, knowledge of scientific and science-like facts, and questions that tapped their ability to transcend erroneous judgmental heuristics and reason in a scientific fashion.

Paranormalism with a Traditional Religious Lineage

I make a sharp distinction between paranormal beliefs that stem from a religious heritage and those that do not. My first generalization: The relationship between education and paranormalism depends on whether a given belief is promulgated by a traditional religious body. Traditional religious beliefs that are paranormal, that is, that violate the canons of scientific causality, exhibit a negative correlation with education and scientific knowledge. Here, Sagan's positivist model is safe and sound. And here, belief in creationism represents the preeminent example.

Practically every poll or survey ever conducted has revealed a negative correlation between education and belief in creationism. (Or, to turn the equation around, a positive correlation between education and belief in evolution.) In a recent Gallup poll, respondents were asked if they agreed with the following assertion: "God created human beings pretty much in their

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present form at one time within the last 10,000 years or so." A majority (or 58 percent) of respondents who were not high school graduates agreed. This figure declined in a step-wise fashion as education increased; only 24 percent of respondents with at least some postgraduate education agreed. There are practically no surveys that contradict this finding. Any observer must be struck by the robustness of this relationship.

The relationship between education and belief in heaven and hell as actual, materially real places, and angels and the devil as materially real beings, follow the same pattern. A national survey by the Pew Research Center found that 92 percent of respondents who had less than a high school education believed in heaven as a real place, while this dropped to 73 percent for respondents with a postgraduate education. The percentage who accepted hell as an actual place fell from 80 percent for non-high school graduates to 56 percent for persons with a postgraduate education. And the same applies to belief in angels and the devil as materially real beings. Roughly 20 to 30 percent more of the least-educated respondents believe in angels than is true of the most well-educated ones. Possession by the devil is especially steeply graded by education. A recent Gallup poll revealed that a majority (or 56 percent) of the less than high school educated respondents believe that "people on this earth are sometimes possessed by the devil" while only 22 percent of the more than college-educated respondents do.

So, here's my first generalization: *Paranormal beliefs that are sustained by a religious tradition bear a negative relationship with education.* The greater the education, the lower the level of acceptance of belief in religious assertions that science says are all but impossible in the strictly material sense.

Paranormal Beliefs without a Religious Lineage

But traditional religion-based paranormal beliefs are not the only dimension of paranormalism. For instance, many observers argue that the belief that UFOs are alien or extraterrestrial aircraft is a form of paranormalism. This is so, they say, for two reasons. One, according to Einstein's theory of relativity, objects cannot travel faster than or even approach the speed of light. Hence, any spaceship from an inhabited planet could not get to Earth within the lifetime of any conceivable living being. Whether such a scientific or technological feat is possible is secondary to the fact that most UFO believers appear to manifest no interest whatsoever in the nuts-and-bolts physics of such a feat, assuming that extraterrestrials could simply "transcend" the laws of nature. And two, a second reason why belief that UFOs are alien craft is paranormal in nature is that a very high proportion of UFO believers attribute almost godlike—and most decidedly paranormal—powers to alien visitors. Achieving such feats such as moving through solid objects such as walls; teleportation or "beaming up" large objects, including entire cities, to their mother ship; floating or hovering in space; and traveling through time are considered by believers not only possible but routine accomplishments of these extraterrestrial visitors (see Mack 1995).

In contrast with belief in creationism, education bears an *inconsistent* relationship with the belief that UFOs are "something real." There is no step-wise correlation here. In a survey sponsored by *Newsweek* and conducted by the Princeton Survey Research Associates, the percentage who believed that UFOs are alien space ships was the same for respondents without a high school education as for those with a postgraduate education. In a Gallup poll, the educational category with the highest level of belief that UFOs have visited Earth was respondents with some college (51 percent); the percentage was lower for less than high school graduates (48 percent) and respondents with a postgraduate education (39 percent). In a Yankelovich poll, the percentages answering yes to the question "Do you personally believe in the existence of UFOs?" was almost perfectly flat by education until the category postgraduate education, which dipped slightly. The fact is, there is no consistent relationship between education and belief that UFOs are alien aircraft.

Generalizing even further, most of the classic paranormal beliefs also bear an inconsistent relationship with education. Some surveys indicate a negative relationship for some paranormal beliefs, but for most surveys and for most beliefs, the results are noteworthy for their lack of pattern. A survey conducted by the Princeton Survey Research Association for Newsweek found that high school dropouts were barely more likely to agree with the statement, "Do you consider yourself a believer in the paranormal and supernatural?" (43 percent versus 39 percent). Moreover, in-between educational categories were not necessarily in between with respect to belief. The same applied to telepathy, ESP, and astrology. A Gallup poll found a strong and consistent negative relationship between education and belief in astrology—but it also found that postgraduates were more likely to believe in telepathy than high school dropouts. However, the Gallup poll's relationship between education and belief in communication with the dead was practically flat. True, the National Science Foundation's recent survey, *Science and Engineering Indicators*, found a negative correlation between education and belief in astrology, but a scan of dozens of public opinion polls finds an inconsistent relationship between education and the classic forms of paranormalism—with the possible exception of belief in haunted houses, which the least well-educated seem to be consistently more likely to believe in than the best-educated. This is not good news for the enlightenment thesis that more education will provide "a candle in the dark" and defeat the "demon-haunted world" of paranormalism.

Science and Science-Related Knowledge versus Paranormal Beliefs

I look into this relationship from a slightly different angle by exploring the correlation between science and science-related knowledge and paranormal beliefs. I polled two classes of students at an Eastern state-supported institution of higher learning. Among other questions, I asked them about paranormal beliefs, scientific and science-like facts, as well as questions designed to elicit respondents' capacity to reason systematically and scientifically, in contrast to using commonsensical judgmental heuristics often employed by much of the lay public, as spelled out by psychologists Daniel Kahneman and Amos

Tversky (Kahneman, Slovic, and Tversky 1982). I asked my respondents which planet is closest to (Mercury) and which one is farthest from (Pluto) the Sun; which is the second most populous country in the world (India); which is the northernmost state (Alaska); questions pertaining to Tversky and Kahneman's representativeness heuristic (Is Tom more likely to be an accountant or a professional football player? Is Jane more likely to be a school teacher or an astronaut?); some knowledge of the law of large numbers (Is the likelihood that 60 percent of the babies born each day will be boys greater for a small or a large hospital?); and knowledge of simple statistical reasoning (On a given trip, is the fatality rate higher for cars or motorcycles?).

Yes, it's true: Fairly consistently, my data demonstrate that a negative relationship exists between adherence to the religious beliefs that contain a paranormal component and scientific and science-like knowledge and reasoning. The relationship was not always statistically significant, but the *direction* of the relationship is remarkably consistent. Fairly consistently, the respondents who believed a) in the creation of the universe in six days less than 10,000 years ago; b) in angels and the devil as materially real beings; and c) in heaven and hell as materially real places knew less about the physical world than nonbelievers did. They were also more likely to make use of commonsensical but erroneous judgmental heuristics, and were less able to reason on the basis of a science-like thinking process. Not only are persons who accept extra-scientific religious assertions more likely to reject science's take on reality but they also tend to know less about science and how it works. So far, so good.

What about the dimensions of paranormal belief that do not owe their existence to traditional religious dogma? Believers in UFOs were a bit more likely than nonbelievers to know that Mercury is the planet closest to the Sun than nonbelievers but a bit less likely to know that Pluto is the farthest planet from the Sun. Neither relationship approaches statistical significance. UFO believers were slightly less likely to know that India is the second most populous country in the world but a smidgen more likely to know that Alaska is the northernmost state in the United States. Neither relationship is even remotely statistically significant. A variety of questions entailing reasoning by means of commonsensical judgmental heuristics versus scientific reasoning yielded no differences whatsoever between UFO believers and nonbelievers. In short, answers to the science questions for respondents in these two categories were all over the map, with no consistent pattern or direction.

I ran the same correlations for agreement with the assertions: "An ancient curse on the tomb of King Tut actually killed people," "Some people have special psychic powers," and "Some numbers are especially lucky for some people." The same relationship as for belief in UFOs as real prevailed: Paranormalism bears an inconsistent relationship with scientific knowledge and reasoning. So, here's my second generalization: If my little study and the many relevant public opinion polls conducted each year are any guide, *non-religious paranormalists know about as much science, and reason as scientifically, as persons who reject the validity of paranormal* or *extrascientific forces.*

Conclusions

But if this much is true, then why doesn't the same relationship that holds for religiously based paranormalism prevail for paranormal beliefs that are separate and independent from traditional religious dogma? My speculation is that the relationship I've looked at here is confounded by another dimension: *traditionalism.* Persons who accept the assertions of paranormal events as dictated by fundamentalist religious dogma tend to be more traditional, conservative, and conventional across the board than is true of persons who reject the validity of such assertions. At the same time, persons who accept non-religious paranormal assertions as valid tend to be less traditional, more liberal, and more unconventional than those who do not. It's possible that any educational curriculum aimed at the strictly cognitive level will not make much of a dent in this fundamental and primal relationship.

Henri Broch (2000) reports that, in France, public opinion polls actually demonstrate a *positive* relationship between paranormal beliefs and education, that level of belief in paranormalism actually *rises* as education rises. (A finding which strikes at the heart of the Sagan hypothesis.) However, in an attempt to overturn this relationship, he has developed a course at the university level designed to reduce belief in paranormalism by getting students to participate directly and actively in hands-on experiments which demonstrate one or more extrascientific claims to be false by revealing how such claims can be faked. Broch claims extremely high rates of success with these experiments.

Broch's data suggest that the acquisition of education may not demolish paranormal beliefs because much scientific knowledge and even acquaintance with the scientific method operate on far too abstract a level. It is only when specific paranormal beliefs are placed in direct, rude juxtaposition with a specific, systematic, empirical test that faith in them is diminished. In other words, for the mass of the public, working from the top down doesn't seem to have an impact.

I don't recommend that we abandon science in our educational curricula. But what I wonder about is *how* science is taught. It's possible that most science instructors don't consider paranormal and pseudoscience assertions a sufficient threat to science that they confront them directly with the evidence of our senses. It's possible that the current curriculum isn't doing enough to combat pseudoscience. Clearly, we have a great deal to learn about these relationships and what we can do about them—or even if we can do anything about them at all.

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A University's Struggle With Chiropractic

York University recently rejected a merger with a chiropractic college. The deliberation process leading up to this decision illustrates how susceptible universities can be to overtures by colleges of alternative medicine. Lessons learned from this situation may prove helpful for institutions facing similar temptations in the future.

MICHAEL De ROBERTIS

"Senate's approval in principle has been negated." With these words on April 26, 2001, York University rejected an affiliation proposal with the Canadian Memorial Chiropractic College. The unfolding of the six-year deliberation process leading up to this announcement provides a good illustration of the current political climate within universities and the temptations they face. Since such pressures will only increase as the popularity of alternative medicine grows, it is important to chronicle York's story and to reflect on the lessons that have been learned.

York University, located in Toronto, Ontario, is the third-largest university in Canada with over 1,000 faculty and

an enrollment of 40,000 students. Though it has a relatively small science faculty—the Faculty of Pure and Applied Science (FPAS)—it has no medical school or large-scale health program.

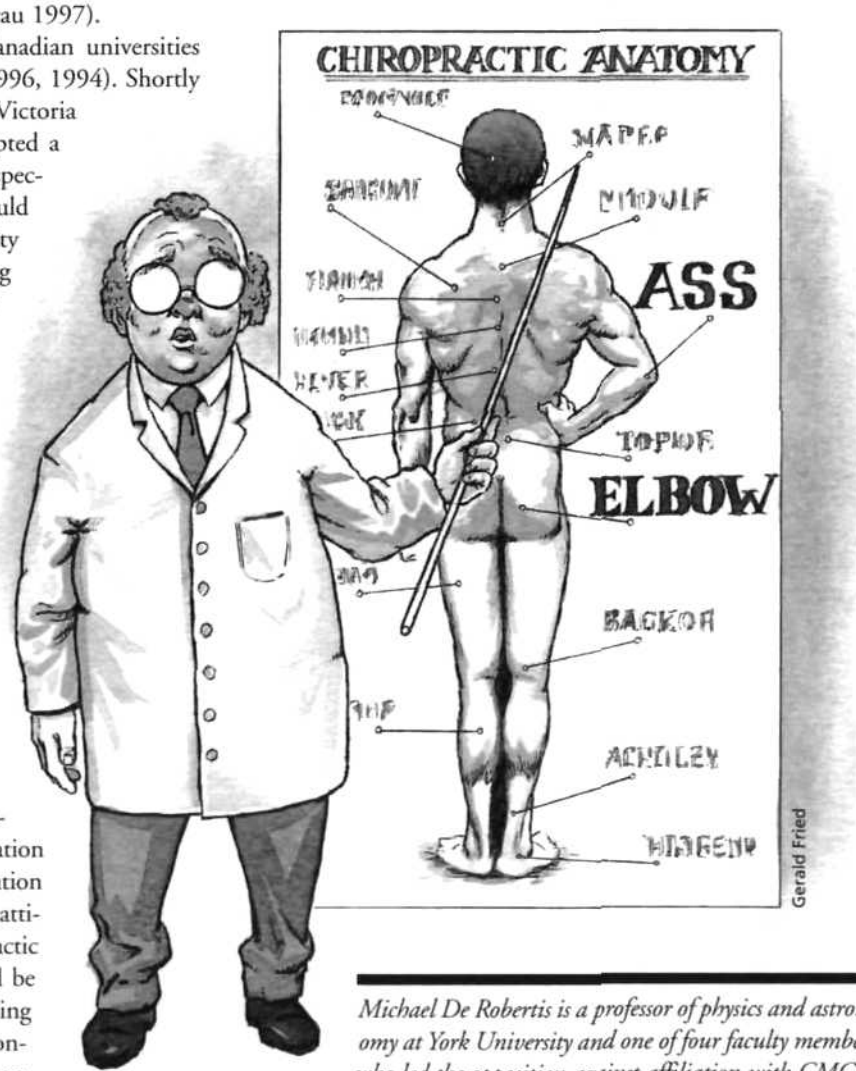
The Canadian Memorial Chiropractic College (CMCC), also in Toronto, has about 100 faculty and admits about 160 new students annually into its four-year Doctor of Chiropractic (D.C.) program. The College was opened exactly fifty years to the day after D.D. Palmer, the founder of chiropractic, gave his first adjustment, and hence the "Memorial" in the College's name. More than three-quarters of licensed chiropractors in Canada have graduated from CMCC (Kopansky-Giles and Papadopoulos, 1997) and less than 19 percent "rejects traditional chiropractic philosophy as espoused by D.D. and B.J. Palmer and emphasize the scientific validation of chiropractic concepts and methods" (Biggs, Hay, and Mierau 1997).

CMCC has sought affiliation with Canadian universities over a dozen times in its history (Brown 1996, 1994). Shortly after being rejected by the University of Victoria (British Columbia) in 1992, CMCC adopted a "revenue-neutral" model for attracting prospective partners, meaning that CMCC would remain fiscally separate from its university partner after the merger. York was among three Ontario universities that found this new approach appealing and in 1995 signed an agreement to enter into exclusive negotiations with CMCC. The basic understanding was that CMCC would provide a sum of $17 million (U.S.) for new buildings, infrastructure, etc., while York would mount some courses for chiropractic students and offer a D.C. degree.

Deliberation Prior to "Approval in Principle"

Thus began a seriously flawed, six-year adjudication process at York University that spanned two administrations and spawned numerous committees. Throughout this period, neither York's administration nor its Senate expressed the slightest reservation that the pseudoscientific and antiscientific attitudes harbored by contemporary chiropractic and evident in CMCC's curriculum would be legitimized by an affiliation, compromising York's academic integrity. Moreover, they continually ignored pleas to solicit expert opinion from the external biomedical community on the grounds that York was entirely capable of dealing with this issue on its own, despite the fact that there were no experts on campus. An informed decision was particularly important in this instance because York was poised to become the first major university in the world to merge with a chiropractic college.

Scientists were repudiated for their adherence to "the truth" when there are clearly "many truths." Being "grant-fixated" they were said to be incapable of recognizing that alternative medicine is the way of the future and that York should be a leader and not a follower.



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The first act of York's then-Vice President of Academic Affairs was to create an internal six-member Task Force whose mandate was to advise the administration on the academic integrity of CMCC's programs and curriculum and the opportunities for academic links between CMCC and York University. The fact that the Task Force Report strongly endorsed an affiliation and found no areas of concern for York's integrity was not surprising: none of the Task Force members was an expert in chiropractic, and the most influential member, one of only two scientists and a distinguished biologist, had been advocating a closer relationship with CMCC for more than two decades. Even had members been aware that CMCC's course descriptions referred to unscientific "subluxations," that CMCC supported pediatric chiropractic that has been soundly condemned by the Canadian Pediatric Society, that CMCC officially advocated "choice" in immunization, that its curriculum emphasized chiropractic radiology, etc., it is unlikely the report would have turned out differently, as future events were to reveal. (For more details about difficulties with CMCC and contemporary chiropractic, see De Robertis et al. 1999, Barrett 1999, and Homola 2001.)

Why no York official felt compelled to address a single biomedical concern is a matter of some speculation. University officials may well have been confident that their support was deep enough that they could get away with ignoring scientific issues.

The way was now clear to draft an affiliation proposal that would come before the Senate in spring 1998 for "approval in principle." Why was York's senior administration so supportive of this proposal and confident of its merits? There are indications that it felt that a merger would make York an instant "player" in the burgeoning field of health-care policy in Canada, something considered important by influential social scientists on campus.

It is interesting to consider the reasons offered by York affiliation proponents at one time or another to justify their position:

a) Chiropractic is a licensed, regulated profession in Ontario and as such there could be no question of its legitimacy as a university discipline.

b) Chiropractic lacks a research maturity largely because the hegemonous medical establishment has marginalized it for years. As a result, chiropractic finds itself in a position analogous to conventional medicine a century ago.

c) Chiropractic certainly needs some reforming, and the best way to do so—and the most socially responsible way—is to bring it within a university environment.

d) Chiropractic works.

e) The "buy-in" price of $17 million.

Each of these arguments is quite facile and easily refutable. The first was by far the most popular defense of this initiative. Few seem to recognize that licensure has little to do with scientific legitimacy or the ability to establish a research culture, the essential issues at hand for a major university. Massage therapy, for example, is licensed and regulated in Ontario, but no one has suggested offering a university degree in it; (b) is simply inaccurate, though it may sound convincing to some academics for whom everything is political. Chiropractic has remained on the margins by choice, refusing even today to reject vitalism in all its guises. And there is considerable doubt that a four-year university program culminating in a D.C. degree is necessary to treat musculoskeletal conditions, something conventional therapists do with comparable effectiveness but without the vitalistic baggage; (c) is entirely irresponsible until chiropractic renounces its antiscientific practices and attitudes of its own volition. Moreover, if social responsibility were the issue, a merger with an institution with a medical school would be far more appropriate; (d) there are no compelling studies that show that chiropractic therapies are safe and effective. Some may even be dangerous (e.g., Norris, Beletsky, and Nadareishvili 2000); (e) though fiscal pressures on universities may be enormous, is academic integrity for sale?

Scientists in FPAS reacted swiftly and proactively to the proposal. Prior to the Senate vote, FPAS formed a committee to investigate chiropractic and CMCC—to take its own look at the issues. The committee's first act was to solicit advice from external biomedical experts. What it learned was so disturbing that the overwhelming majority of scientists formally voted to have no association with CMCC whatsoever a few weeks before the Senate vote was scheduled.

What transpired at the May 28, 1998, Senate meeting was a chilling reminder how tenuous truth's foothold is within the contemporary university (De Robertis 1998). Not only were FPAS's democratically expressed views ignored, but many senators took the opportunity to deliver flagrantly antiscience speeches while extolling the proposal. Scientists were repudiated for their adherence to "the truth" when there are clearly "many truths." Being "grant-fixated" they were said to be incapable of recognizing that alternative medicine is the way of the future and that York should be a leader and not a follower; affiliating with CMCC would be the first step toward securing a medical school; *Qi gong* and chiropractic are important to help our dance students . . . and so on. Neither FPAS's dean nor its senators countered any of this nonsense. Some science senators even apologized for FPAS's vote. In the face of this tidal wave of irrationality, the Senate voted overwhelmingly to grant the proposal "approval in principle."

Deliberations After "Approval in Principle"

Fortunately, this was not the end: "Approval in principle" is given to proposals in order to establish a more thorough and

deliberate vetting process to be followed at a later time by a final vote in Senate. There was nothing thorough about what transpired, however.

It was during this period that a small group of faculty (three physical scientists and a psychologist), with advice from individual experts from the biomedical and scientific communities in the United States and Canada, mounted a coordinated campaign against the biased and uncritical process. The group's chief demand was for equal time; since the university had solicited advice extensively from alternative medicine practitioners, it should offer the biomedical community a similar opportunity. How else could an informed decision be achieved?

Yet the administration and Senate ignored or refused all such requests. They never invited a single biomedical expert critical of chiropractic to testify on the merits of this proposal of their own volition and ignored the following compelling testimony provided in 1999–2000:

a) a petition organized by the Council for Scientific Medicine whose signatories included two Nobel laureates in medicine that asked York not to proceed (www.csicop.org/articles/19990203-chiropractic/).

b) a petition from 150 York faculty and graduate students asking for the university to reopen the process, this time soliciting evidence from the biomedical community.

c) a letter from the Canadian Pediatric Society repudiating pediatric chiropractic and asking York not to legitimize it (www.ndir.com/chiro/cps.html).

d) dozens of letters from prominent medical doctors, scientists, academics, and skeptics from around the world asking York to reconsider this proposal.

e) full-page ads in the student newspaper from the "opposition," drawing attention to the anti- and pseudoscience attitudes within contemporary chiropractic and present in CMCC's curriculum, as well as serious flaws in the vetting process.

Why no York official felt compelled to address a single biomedical concern is a matter of some speculation. University officials may well have been confident that their support was deep enough that they could get away with ignoring scientific issues.

When FPAS rejected any association with CMCC, the university had to identify another host faculty if it wished to carry through with the proposal. Still strongly supportive, it chose Atkinson College, a Faculty of Liberal and Professional Studies, which had a small nursing program and which aspired to a School of Health Studies.

Atkinson unexpectedly showed little enthusiasm for this initiative. Its first committee established to consider whether to host CMCC issued a split report in June 2000. At that point, five years into the process, CMCC made it clear it was growing impatient. Within two months, another Atkinson committee was created whose mandate was to explore all possible relationships the two institutions might share. The composition of this committee illustrates how desperate things had become: of the six voting members, five were on record as having spoken favorably of the proposal. Of the six nonvoting members, five were chiropractic supporters, including two representatives from CMCC. (The full text of these and other relevant reports can be viewed at www.ndir.com/chiro/chronology.html.)

Chiropractic proponents sometimes referred to a merger between York and CMCC as a "marriage," while at the same time admitting that chiropractic needs to be reformed. Yet no counselor recommends marriage in order to change a partner.

While it came as no surprise that the committee report submitted in November 2000 favored a full affiliation, it was a major surprise that Atkinson's faculty in March 2001 rejected any association with CMCC, thereby putting an end to this nightmare once and for all. York and CMCC agreed to go their separate ways.

Lessons Learned and the Future

In some ways, York University is atypical of major universities because of its lack of a medical school and relatively small science Faculty. But in many ways, the difficulties it faces are symptomatic of the times. With ever-shrinking budgets, university administrations are challenged more and more to devise creative ways of securing funding.

Enter alternative medicine, whose popularity with the public is growing rapidly. Colleges of acupuncture, homeopathy, and naturopathy have become ubiquitous in major centers, along with chiropractic colleges. Can there be any doubt that those with "deep pockets" will seek legitimization through affiliations with universities in the future? Interested university administrations will spin it differently. They will speak about the social responsibility of their institution both for improving the training and outlook of alternative practitioners and in demonstrating the safety and efficacy of the relevant therapies.

But this overlooks two very important points. Chiropractic proponents sometimes referred to a merger between York and CMCC as a "marriage," while at the same time admitting that chiropractic needs to be reformed. Yet no counselor recommends marriage in order to change a partner. First change, then talk. In the same way, even if some alternative therapies are eventually found to be effective and safe, until colleges adopt contemporary biomedical paradigms instead of millennia-old vitalistic notions—i.e., get rid of the nonsense in their curricula and make an attempt to educate its practitioners—no university should contemplate an affiliation. Furthermore, contrary to arguments made by some sociologists, no university has a responsibility to take in an alternative medicine

community simply because a significant minority of the population uses its therapies. Many adults believe in astrology, but university administrators wouldn't entertain a serious suggestion to merge with a school of astrology (one hopes).

Second, a responsible affiliation presupposes that relevant alternative therapies have been demonstrated to be safe and effective. Very few universities are capable on their own of assessing whether therapies are safe and effective. This is the responsibility of institutions with significant budgets and the will to carry out such tests like the National Center for Complementary and Alternative Medicine of the National Institutes of Health.

No university has a responsibility to take in an alternative medicine community simply because a significant minority of the population uses its therapies.

York's administration won't be the last to contemplate seriously an affiliation with a college of alternative medicine. Based on the experience at York, the following insights might prove useful for another institution facing a similar situation.

• Scientists must become involved as early as possible in the process in order to impress upon the administration the importance of adhering to scientific, academic, and ethical integrity and to filter out the facile arguments of the type cited above. While it is necessary to have a core group of scientists leading the charge, it is equally important to obtain broad-based support from a number of departments and faculties, especially outside of science, in order to diminish the effectiveness of anti-science attacks. These supporters must include faculty administrators whose position must be made loud and clear. All participants, regardless of their position, should declare any conflict of interest at the outset, and benefits accruing to a department or faculty from a merger should be clearly identified.

• Always take the "high road." Those for whom scientific integrity is secondary might reject the science faculty's position if they perceive it has been made in an unscholarly or arrogant manner. For such faculty, it is particularly effective to identify violations of process. Such violations may be an indication that the administration has not thought things through properly, or may be hiding things. It might also help to point out to the community that such an affiliation effectively amounts to the "corporatization of the university."

• It is important to introduce precedence into the conversation as early as possible. At York University, the more than a dozen previous affiliation attempts by CMCC were unknown to the community until well after "approval in principle" had been granted. If other institutions have turned down a similar affiliation in the past, why should your university even consider this proposal?

• Where an institution has no internal expertise in the area, both the alternative and conventional medical communities should be consulted. If the administration or faculty refuses, then it is up to the science faculty to press its case with all legal means at its disposal.

• Local and national medical associations should be pressed to provide clear statements on areas of concern about alternative medicine. Fearing legal consequences, most medical associations and conventional practitioners now appear to have adopted the "live and let live" approach when it comes to alternative medicine. Yet where biomedicine has serious evidence-based criticisms of an alternative therapy (e.g., pediatric chiropractic), it has a responsibility to alert the broader scientific community, politicians, and the public. It would be convenient if medical societies could provide regularly updated position papers on alternative therapies.

• Never give up! There are a couple of instances when things looked particularly bleak at York, but the sun always seemed to rise again. No single tactic won the battle. For this reason, it is important to mount a campaign that is broadly based. It is likely that you will receive strong support from many colleagues in private, but very few will stand at your side in public. And be prepared for scientists who will support the proposal, defying all logic. Scientists are as susceptible as anyone else to the temptations of politics.

Finally, it is important to view your own struggle in the broader context, as part of a much larger campaign in which all skeptics are called to participate. Cash-strapped, postsecondary institutions will continue to be wooed in the near future by alternative medicine: "Have money, seek legitimacy. Are you for sale?" And the moment the first university succumbs to this temptation, society will have taken a fork in the road that leads away from enlightenment.

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Snaring the Fowler: Mark Twain Debunks Phrenology

In the 1870s Mark Twain performed a single-blind reliability test on the analysis technique of Lorenzo Niles Fowler, one of the eminent phrenologists of the day.

DELANO JOSÉ LOPEZ

In Mark Twain's *A Connecticut Yankee in King Arthur's Court*, the protagonist, Hank Morgan, watches his medieval companion wallowing with some pigs she believes are enchanted nobles, and says, "I was ashamed of her, ashamed of the human race." Twain's own shame and embarrassment at his fellow humans wallowing in superstition and pseudoscience can be seen throughout his career.

Like many good skeptics, Twain was an experienced hoaxster and prankster himself. When he was a young newspaper reporter, he wrote a spoof of the numerous spurious archaeological claims accompanying the western expansion. In his "Petrified Man" he described the discovery of such a find. Presented as an legitimate news article, the account

included a number of geographical improbabilities that anyone familiar with the local area would have recognized as farcical, or so Twain thought. He was disappointed to discover that his readers and credulous papers across the country (and even internationally) had uncritically accepted the story. If a careful reader pieced together the positions given for the hands and fingers of the petrified man, it would have been apparent that he was literally thumbing his nose at posterity.

Twain's critique extended to paranormal and religious claims, heaping scorn on Mary Baker Eddy and Christian Science. He was also skeptical of the Book of Mormon and its claims of divine authorship.

The ease with which this spoof was accepted as fact most likely contributed to Twain's lifelong concern with critiquing and disproving both accepted truths and exceptional claims. No mere humorist, he was an outspoken political, social and literary critic, his targets ranging from American imperialism ("To The Person Sitting In Darkness"), anti-Semitism ("Concerning the Jews") and anti-Chinese bigotry, ("Goldsmith's Friend Abroad Again") to the "literary offenses" of James Fennimore Cooper and the authorship of Shakespeare's plays.

His critique extended to paranormal and religious claims, heaping scorn on Mary Baker Eddy and Christian Science, arguing that it was unlikely that Eddy was the sole author of *Science and Health.* He was also skeptical of the Book of Mormon and its claims of divine authorship. It was this hostility to delusion that led to an encounter between Twain and another giant of the nineteenth century, a celebrity in his own right, Lorenzo Niles Fowler.

Both were self-made men rising from humble beginnings to become great celebrities of the day, riding to fame on the leading trends and movements of their time. One, however, remains a household name, the other has faded into obscurity. The two men shared many similarities both in character and outlook, yet they were destined to be at odds over Fowler's purview, phrenology.

Phrenology and the Fowlers

To understand much of that century it is important to understand phrenology, for that belief colored much of the country's thinking at that time regarding what motivated human behavior. As taught by its practitioners and followers, no less than the totality of human experience could be explained by the proper application of this science. To this end, Lorenzo and his brother Orson Squire Fowler published books dealing with a variety of applications of phrenology to daily life, from how to discover the ideal mate to what qualities should be sought in an employee. Phrenological influence can be seen in the writings of Whitman, Poe, and Melville.

The Fowlers rose to prominence as the heads of a phrenological empire based at the Phrenological Institute in New York City, where Lorenzo performed phrenological readings on clients. In addition, the brothers trained the next generation of phrenologists. Connected to the Institute was the Phrenological Cabinet, nicknamed "Golgotha," which housed a huge collection of skulls, used both for research purposes and as a museum open to the public. It was often P.T. Barnum's most serious competition for tourists. Eventually it became fashionable to have a reading done by the famous phrenologists, and many celebrities of the day had their heads examined, including Julia Ward Howe, Clara Barton, Hiriam Powers, Theodore Weldand, and Edwin Forrest. The Fowlers became celebrities in their own right, even being satirized in the popular press, along with a business partner, Samuel Wells, as the firm of "Bumpus and Crane"

The brothers Fowler also managed a large publishing house, which issued phrenological works written by the Fowlers and others, including the *Phrenological Journal.* They were not merely phrenologists, however, but considered themselves part of a larger progressive movement that was sweeping away traditional superstition and bigotry and replacing it with rational reform. In service to this ideal they published a rather inclusive and eclectic collection of the nineteenth century's equivalent of self-help books, including works on hydropathy, homeopathy, and how to inexpensively build one's own octagonal concrete house. They published works on subjects as diverse as poetry, early feminism, and the new art of photography. They published the first edition of Whitman's *Leaves of Grass,* and a photography magazine, *Life Illustrated.* Their circle of friends included such reformers as feminist Amelia Bloomer and nutritionist Sylvester Graham.

Enter Mark Twain

It was with some irony that the encounter between these two examples of the spirit of American progress was to be set in London. Fowler had moved to London in 1863 and opened a branch of the firm. (Fowler and Wells at various times also had branches in Boston and Philadelphia.) Twain often toured Europe and lived there for extended periods, in an attempt to "better" himself through exposure to European culture. Many nineteenth century Americans had similar feelings of intellectual inferiority.

Twain had some experience with phrenology, having written of the itinerant phrenologists of his youth coming to Hannibal and giving demonstrations. (Some speculate that

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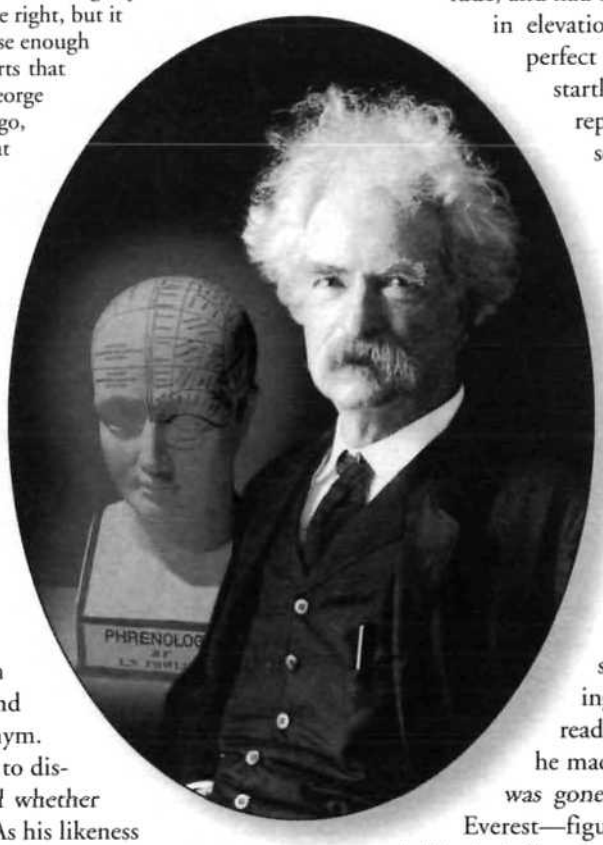
these unnamed phrenologists may even have included one of the Fowlers, though no proof exists.) He also was familiar with the technique now referred to as cold reading, giving a scornful description of it in the beginning of his "Lionizing Murderers," wherein the fortune teller starts her reading with, "You have had much trouble, some joy, some good fortune, some bad." Further, he was aware of how phrenologists had used such generic readings to appease their clients. In his autobiography, he describes the phrenologists visiting Hannibal in *his youth:*

> It is not at all likely, I think, that the travelling expert ever got any villager's character quite right, but it is a safe guess that he was always wise enough to furnish his clients character charts that would compare favorably with George Washington's. It was a long time ago, and yet I think I still remember that no phrenologist ever came across a skull in our town that fell much short of the Washington standard. This general and close approach to perfection ought to have roused suspicion, perhaps, but I do not remember that it did. It is my impression that the people admired phrenology and believed in it and that the voice of the doubter was not heard in the land. (Neider 1959)



Forearmed with a knowledge both of phrenology and the tricks of con artists, he performed a simple single-blind reliability test. In 1872 or 1873, Twain visited Fowler's London office and paid for a reading using a pseudonym. It is unclear whether he attempted to disguise his physical appearance, and whether he wore his trademark white suit. As his likeness had been used in advertising, such cautions would have seemed prudent, yet Fowler gave no indication that he recognized Twain. The result was in keeping with his expectations of a cold reading:

> Fowler received me with indifference, fingered my head in an uninterested way, and named and estimated my qualities in a bored and monotonous voice. He said I possessed amazing courage, and abnormal spirit of daring, a pluck, a stern will, a fearlessness that were without limit, I was astonished at this, and gratified too; I had not suspected it before; but then he foraged over on the other side of my skull and found a hump there which he called "caution." This hump was so tall, so mountainous, that it reduced my courage-bump to a mere hillock by comparison, although the courage bump had been so prominent up to that time—according to his description of it—that it ought to have been a capable thing to hang my hat on; but it amounted to nothing, now in the presence of that Matterhorn which he called my Caution. He explained that if that Matterhorn had been left out of my scheme of character I would have been one of the bravest men that ever lived—possibly the bravest—but that my cautiousness was so prodigiously superior to it that it abolished my courage and made me almost spectacularly timid. He continued his discoveries, with the result that I came out safe and sound, at the end, with a hundred great and shining qualities; but which lost their value and amounted to nothing because each of the hundred was coupled up with an opposing defect which took the effectiveness all out of it. (Neider 1959)

According to Twain, Fowler was willing to commit himself on one quality: "However, he found a cavity, in one place; a cavity where a bump would have been in anyone else's skull. That cavity, he said was all alone, all by itself, occupying a solitude, and had no opposing bump, however slight in elevation, to modify and ameliorate its perfect completeness and isolation. He startled me by saying that that cavity represented the total absence of the sense of humor!"

Twain states that this same defect was the only notable deviation of his character from the generic when similar tests were done of palmistry, involving mailing an anonymous photograph or print of his palm, to noted palmists in London and New York. Of eighteen readings, humor was mentioned only twice, and then only to note a definite lack thereof.

Twain returned to Fowler three months later and sat for a second reading, this time identifying himself. On this occasion, the reading differed greatly: "Once more he made a striking discovery—the cavity *was gone, and in its place was a Mount* Everest—figuratively speaking—31,000 feet high, the loftiest bump of humor he had ever encountered in his life-long experience!"

It should be mentioned, however, that this was only a single-blind test, with a subject predisposed to be hostile to phrenology. It is possible that on his second visit, Twain may have conducted himself in a more jovial and humorous manner. However, such attempts at deception were not unknown to the Fowlers, and they claimed to have seen easily through such deceptions before.

In addition, Twain's memory of the reading may have been flawed. Madeline B. Stern, literary historian and definitive biographer of the Fowlers, claims that Twain's terminology (i.e., "bumps" and "cavities") is inconsistent with that employed by the Fowlers. She further doubts that Lorenzo Fowler, known for his prodigious memory, would have forgotten Twain's features in three months.

Yet Twain claims to have kept the charts of the two readings. (For an additional fee, the Fowlers' would provide a chart of one's phrenograph.)

> I went to Fowler under an assumed name and he examined my elevations and depressions and gave me a chart which I carried home to the Langham Hotel and studied with great interest and amusement—the same interest and amusement which I should have found in the chart of an imposter who had been passing himself off for me and who did not resemble me in a single sharply defined detail. I waited for three months and went to Mr. Fowler again, heralding my arrival with a card bearing both my name and my *nom de guerre*. Again I carried away an elaborate chart. It contained several sharply defined details of my character, but it bore no recognizable resemblance to the earlier chart. (Neider 1959)

It is a minor tragedy to the history of skepticism that these charts do not appear to have survived.

Twain, however, was not satisfied and in 1901 he sat for a final reading in New York City. Lorenzo Fowler had passed on by this time, and the business had passed to his sister, Charlotte Fowler Wells and his daughter, Jessie Allen Fowler. It was the latter who most likely gave the final phrenological reading of Twain. (It may have been one Edgar C. Beall, who by this time owned controlling stock in the company and who would later claim to have examined Twain personally. Twain's own notebook has the appointment listed with Jessie A. Fowler.)

The analysis would later be printed in the *Phrenological Journal* and attributed to the editor. Whether by Jessie Fowler or Beall, the author is certainly a better literary critic then Lorenzo Fowler was. This last phrenograph of Twain focuses not on his humor, but on his seriousness and concern for humanity, as demonstrated by his largely developed areas of Conscientiousness and Benevolence. The phrenologist interprets Twain's humor as being merely habitual and a means to the end of his greater social concerns. Perhaps the editor possessed a greater facility at phrenological analysis than Lorenzo, or perhaps he or she merely had a better knowledge of Twain's writing. Significantly, in the almost thirty years that had passed since Twain's first reading his work had matured, and his more serious work was much more well known to the general public. His scathing critique of American imperialism, "To the Person Sitting in Darkness," had been published within the previous year.

Though this analysis was printed, Twain never commented on it publicly. In fact, when in 1906 Twain was asked to contribute to a symposium on phrenology, he mentioned his childhood experiences in Hannibal, and his test of Lorenzo Fowler in London, but did not mention his most recent experience in New York. Madeline B. Stern speculates about the reason for this omission: "Perhaps the analysis had been too telling, the hint at his 'tragic character' too disturbing. Perhaps too Mark Twain balked at disclosing his abiding fascination with the pseudoscience he had scoffed but whose persistent lure he could not resist" (Stern 1971).

Perhaps instead the phrenologists were the beneficiaries of Twain's benevolence. By 1906, phrenology's star had fallen far from its heyday when Twain first went head-to-head with Lorenzo. At this point, many no longer considered phrenology a legitimate science, and America was now looking to the most recent European import, the emerging field of psychoanalysis, to explain human behavior. As the fortunes of the Phrenological Institute had decreased, their offices were forced by falling revenues and increasing rents to move further up town and into less posh surroundings. The office in which Twain received his last reading was no longer the tourist attraction of lower Broadway, but instead a more modest location on East Twenty-First Street. Twain was certainly not one to kick someone when they were down, and perhaps it was out of compassion, and embarrassment for the Fowler family, still carrying on what must have appeared to him to be a foolish endeavor, that he refrained from mentioning their continuing efforts.

Twain may have grown more charitable to those he thought gullible, for by this time he himself had sunk thousands of dollars and years of time into a typesetting machine that would prove a failure. By the turn of the century, both Lorenzo and Orson Fowler were dead, having spent the bulk of their lives advocating a mostly discredited theory. Perhaps Twain, described in that last phrenograph as being "a believer in humanity," "a keen critic of his own," and "of very strong sympathies," saw too much of his own gullibility reflected in that of the struggling twentieth-century phrenologists, and wished to relegate their particular fallacy to humanity's past.

Ultimately, both Twain and the Fowlers were reformers of a sort. The Fowlers' form of phrenology was a curiously American one. Unlike their European counterparts, they did not believe that a person's character was unchangeable, but instead, they taught that a phrenological analysis could turn up defects in character that could then be rectified through proper exercise of the appropriate facility, which would then show up, like an athlete's improved musculature, on subsequent examination. Even the most basic premise of phrenology—that different areas of the brain correspond to different functions—has been held to be true, and is a foundation of modern neuroscience. Their tragic flaw, of course, was the relatively arbitrary assignment of these functions to areas, and the belief in the corresponding shape of the skull. Had they the ability to look at this premise and compare it objectively to controlled data, perhaps they would have been spared such a long exercise in futility.

But as to gullibility, or intuition, many of the causes and ideas championed by the Fowlers were later vindicated, such as the literary work of Whitman, the feminist ideals of Bloomer, or the concrete construction techniques of Orson Fowler. And indeed, many of Twain's, such as his typesetting machine, proved fruitless. However, unlike the Fowlers' largely uncritical acceptance of most innovations which fell within the penumbra of "progress" and "reform," Twain remained critical of both the status quo and its reforms, judging each on its own merits.

Twain's snare of Fowler can be seen as an indictment of phrenology as a science, or of Fowler as a quack. But ultimately it may be, like the medieval maid who believed pigs to be nobles, an embarrassment to humanity itself, that ones as intelligent and sincere as the Fowlers could be self-deluded for a lifetime.

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Three Skeptics' Debate Tools Examined

Occam's razor, assigning burden of proof, and Sagan's phrase about extraordinary claims are often misunderstood. In a debate it always pays to know why these tools work.

ALVARO CASO

Every skeptic should have a toolbox full of debate gadgets to help and guide him or her when confronted by believers of all flavors. This box should include a burden-of-proof compass. It's a useful gizmo that points to whoever has to prove his or her claims. It should be well calibrated; else it tends to always point away from you. You will also need a razor, by Occam, to cut through the boneless lard of unnecessary entities. It should be sharp—unnecessary entities are soft but they can be thick. There are other fine precision instruments, but if you want to be on the cutting edge of skeptic technology you will want the latest rage: a Sagan balance. This fine instrument is designed to measure how extraordinary a claim is, because you should not be

Gerald Fried

satisfied by a proof that is less extraordinary than the claim it purports to prove.

Thus armed, you are ready to charge bravely into the world, ready to tackle any irrational member of your community. But be careful, for sooner or later you are bound to run into an old goat like myself who will take your tools to task.

Every time you pull out your balance and say, "Extraordinary claims require extraordinary proof," I will put your balance on mine, replaying, "Say, that's an extraordinary claim . . . Got proof?" Every time your compass points at me I'll produce one that points at you, by stating that you have the burden of proving that the burden is mine. And every time you pull out your Occam's razor, I will pull mine, asking if your razor is not really a superfluous entity, which should be cut away. Would you be ready to justify the use of your tools?

My sad experience debating in electronic chat-rooms, e-mail lists, classrooms, and elsewhere, is that not many would be. But as faith-mongers are quick to point out, if skeptics cannot justify rationally their views, they are no better than those who proudly take their claims on faith. So let's take a closer look at each of them. If my analysis is wrong, arguing against me will clarify your own ideas, thus sharpening your tools.

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Occam's Razor

Let's start with the venerable razor. Why exactly should we prefer Theory A to Theory B whenever Theory A is more economical?

I have found that the most frequently quoted reason is that nature *is* parsimonious; that it "prefers" an economy of means. This is at best a very peculiar metaphysical claim, and a bad one. If this is taken to be "an axiom of reason" and no further justification is offered, it is indeed no better than faith, for it is certainly not self-contradictory to deny it.

When this is pointed out, many fall back to the softer empiricist idea that we know by induction that nature in fact is economical in its means. However, this seems to me just plain false. I find nature to be rather exuberant: There are millions upon millions of stars in each galaxy of which there are millions. Every day several new species are discovered and usually more than one compete for the same ecological niche. Many organisms reproduce by the hundreds or even thousands, so a few will reach adulthood. Organisms often have more than enough organs to survive (two kidneys, two lungs, etc., when you can live with one of each). Organisms reproduce by means of a genetic code that has large sections that encode nothing. There are more than a hundred elements, most of which are pretty stable. There are several dozens elementary particles. If you are partial to superstring theory, you will need no fewer than ten dimensions. . . . Nope, nature is not simple.

But if that's the case, why should we prefer economical theories? Shouldn't we indeed cut away the razor? On the

contrary, it is precisely because we find nature to be complex that we should prefer simple theories.

Suppose we had an epistemic apparatus (sense organs and brain connections) that allowed us to apprehend in all its complexity any part of nature that we cared to pay attention to. Nature might appear to us boringly simple, but there would be no question about preferring simple theories to complex ones. We could state how nature is in *all* its complex detail immediately.

But we cannot do that. Instead we start by noticing certain regularities, constant conjunctions, as Hume would say, patterns of events. We first posit a causal connection between the events, but often have no clue as to how those regularities occur. Then, with hard work, we may posit laws describing how regular those regularities are, but we may be completely in the dark as to what the mechanisms *behind* those regularities are. Then if we are lucky, we may perhaps glimpse the mechanism, by pointing to finer regularities that had gone unnoticed before, but again may have no clue as to how the new regularities behave, etc. That is, we learn about the world by refining what we already know.

For instance, we all learn rather quickly that unsupported objects fall to the ground. But it was no walk in the park to describe *how* they do so. Intellectual giants like Aristotle and Aquinas got it wrong. Galileo started getting it right and Newton did a brilliant job which Einstein tweaked a bit. However, Newton himself confessed explicitly that he had no idea how gravity works, and was in fact not pleased with the idea of action at a distance. Along came Einstein and refined Newton's descriptions but we still have action at a distance, and some are still not pleased. So is there an elementary particle for gravity? Or is it a wrinkling of space around matter? Invisible spiritual tentacles, perhaps? Maybe none of the above? Imagine Newton had posited that objects are held to each other with perfectly elastic, unbreakable threads so thin that they cannot be detected. Newton's theory would be worse. Clearly it is not good practice to posit hypotheses that have no good evidence in their support, but that is not all. Had Newton talked about thin threads, the theory's predictive success might lull us into thinking that the thin-thread hypothesis is correct. In confessing his ignorance about the nature of gravity, Newton pointed the way for future research. We still do not know for sure what gravity is, but some of the best minds are working on some interesting hypotheses. And it is important that they are working on them; if we thought we knew what gravity is, they might not be.

In investigating how the world is, it is essential to be aware not only of what we know, but of what we *do not* know. Occam's razor, in preventing us from going beyond the simplest description possible, is a methodological tool (certainly not a metaphysical dictum) that helps point out our ignorance. This ensures our theories are incomplete, but correctable. And that is as good as we can get with our epistemological apparatus.

Lets now take a look at the next item in your toolbox.

In investigating how the world is, it is essential to be aware not only of what we know, but of what we *do not* know. Occam's razor, in preventing us from going beyond the simplest description possible, is a methodological tool that helps point out our ignorance.

The Burden-of-Proof Compass

Who does your burden-of-proof compass point to? Many have a faulty model, that points to whomever makes a positive claim. That is, it assigns the burden of proof to subject A if subject A claims X and subject B claims not-X, regardless of the content of X. This is clearly a mistake about the nature of language, for most claims, if not all, can be worded so as to include a "not" in their formulations. For instance, "gold atoms have seventy-nine protons," which would count as a "positive claim," can be reformulated as "gold atoms have no more and no less than seventy-nine protons" thus making it a "negative claim," two negative claims, actually. If that were how quality burden-of-proof compasses worked, everybody would word his or her claims in negative form, avoiding the burden of proof. So it is not.

An equally faulty but somewhat more sophisticated model points to whoever makes a claim that *implies* a "positive existential claim." This seems to solve the difficulty because both formulations above imply the same existential claims. The mechanism behind this compass model is based on the idea that negative existential claims cannot be proven. Since it would be irrational to ask someone to do something that cannot be done, the one making the positive existential claim has the burden of proof. But again, these compasses are faulty.

If the burden-of-proof compass pointed to only those making existential claims, its use would be very limited. It would leave us in the dark about who has the burden of proof when no existential disagreement exists. For instance, "gold atoms have seventy-nine protons" implies that there is gold, that there are atoms, and that there are protons. It also implies that those atoms that have seventy-nine protons make up the stuff we call gold, but that is not an existential claim. Now suppose along comes Professor Mad Chemist, claiming that gold atoms have seventy-eight protons instead of seventy-nine. We would intuitively want to say the burden of proof is on Mad Chemist, yet we cannot pin it on him. His claim implies that there is gold, that there are atoms, and

that there are protons, but the disagreement is that according to Mad Chemist, atoms that have seventy-eight protons make up the stuff we call gold. But again, that is not an existential claim, so he wouldn't have the burden of proof. Furthermore, Mad Chemist might get nasty and argue that whoever says gold has seventy-nine protons is claiming the existence of one more proton than he is, so the burden of proof is on sane chemists. Not good.

Theories are confirmed with each successful experiment, each accurate prediction, each satisfactory explanation. An established theory does not have the burden of proof because it has already been (tentatively) proven.

A second objection against the idea that the burden-of-proof compass points to the one making the positive existential claim is that a cursory glance at the history of science reveals that is not so. There are many examples of nonexistent entities that had to be proven not to exist. Phlogiston is perhaps the best-known example, along with the nonexistent element "Caloric," which supposedly accounted for the behavior of heat, but there are many others. So no, your compass should not point to the person making a positive claim of existence.

The above considerations show that the basic mechanism of these compasses is faulty; the fact is that you can prove a negative existential claim. The supposed asymmetry between proving a negative existential claim and a positive one is so widespread that it may be worth elaborating a bit. It is thought that if you are wondering whether entity X exists, you go looking for X. If you find an X, then that is that, you have proven its existence, while if you go looking for X and do not find an X, you just proved X is not where you looked for, but not that X does not exist. But things are not really that simple. First of all, you may have a theory that predicts X must appear under certain circumstances; if it doesn't appear it doesn't exist. Or through theoretical considerations you can limit the number of places where to look, so that if X does not appear in any of those places, it doesn't exist, because it won't appear elsewhere. Or, you may have some theoretical idea of the effects X should produce; no effect, no X. If you have no such theoretical constraints, if you are really supposed to look for X in every nook and cranny of the universe, you probably have no theoretical reason to suppose X exists in the first place, in which case it goes with Occam's razor.

But wait—you may say—that is cheating: If the theory predicts X will appear here and it doesn't, it may indeed be that X does not exist, but it may also be that the theory is wrong and X does exist after all, so that's no proof that X does not exist. But it's not cheating. Look at all the evidence there is for the existence of atoms (a positive claim of existence). It is equally dependent on the correctness of some accepted theory or other. All proof, including that of positive claims of existence, is theory dependent. Of course, this means that proofs are never 100 percent certain, but that is as they should be, because certainty is unattainable.

Back to the burden of proof. We are now in a position to see what the correct mechanism for a quality compass should be. A good burden-of-proof compass should point to whoever makes a claim that contradicts established theory—one that goes against the best evidence accrued. The reason is simply that theories are confirmed with each successful experiment, each accurate prediction, each satisfactory explanation. An established theory does not have the burden of proof because it has already been (tentatively) proven. A claim that goes against established theory would have to not only be proven, but preferably either subsume in corrected fashion the previously established theory, or offer some explanation as to why it seemed to work.

A word of warning: It is not always easy to determine what the best evidence is. Worse, it is not always easy to determine what the data is evidence for or against. So be prepared to engage in detailed factual and logical debates, because your burden-of-proof compass is liable to get you into uncharted territory rather than out of it.

Sagan's Balance

Let's move now to Sagan's Balance. On one hand, the idea that extraordinary claims require extraordinary evidence seems . . . extraordinary, to say the least. We would want to say that we are fair, that we judge any claim strictly on the force of the evidence for or against it, no matter if it is ordinary or extraordinary, boring or outrageous. Any claim needs good solid evidence to be proven, no more, no less. On the other hand, suppose you see a car moving down the street. That is good solid evidence for there actually being a car on the street. Now suppose you see a pink semitransparent elephant with green freckles walking down the street. Why is that not good evidence for there being such a beast on the street? The evidence is the same for each. So what do we do, are we fair (taking each observation at face value) or commonsensical (dismissing the flimsy pachyderm as a prank, a publicity stunt, or even a faulty brain)?

To answer this question we need to look at what we consider extraordinary. Thousands of previous instances of cars moving on streets tell us that cars usually populate streets, so much so that a street devoid of cars is rather eerie. In contrast, we take the pink elephant sighting to be extraordinary because past experience tells us that elephants rarely walk the streets, are usually not pink, and vertebrates are usually not semi-

transparent. Therefore it is wrong to say, as I did before, that the evidence is the same for both. The elephant sighting is extraordinary precisely because the cumulative evidence would point to there not being such a beast, whereas it would point to the car definitely being there. Thus, the fair *and* commonsensical thing to do is discard the elephant as fictitious and keep the car as real. In this sense, Sagan's Balance, is "just" a tautology: those claims that are extraordinary are precisely those that would require confirming evidence the most, because what makes them extraordinary is past experience to the contrary. But tautologies can be informative and useful. In this instance, Sagan's Balance reminds us that knowledge is a cumulative interpersonal enterprise, not a personal, subjective, and heroic quest.

These considerations may shed some light on that most vexing question every despairing skeptic poses at some point: "Why do believers believe in the face of recalcitrant evidence to the contrary?"

Past experience and theoretical considerations not only furnish explanations of our experiences, but also determine what counts as a genuine experience and what we dismiss as an artifact, mirage, coincidence, hallucination, or conspiracy. We knit a highly interconnected web of beliefs that support one another. Therefore, anyone who has spent a lifetime interpreting coincidences as poltergeists, demons, "forces," "energies," and the like will tend to explain a poorly latched window that suddenly opens as a visitation from a spirit. Likewise, such a person will dismiss or explain away any and all evidence to the contrary. After all, that is the rational thing to do given that person's epistemological baggage.

That is also why skeptics are often accused by believers of just trying to debunk, instead of having a truly open mind. The accusation trades on the ambiguity of the phrase "open mind." It often means approaching a subject with no preconceptions. In this sense, the accusation is correct but harmless. It is correct because when confronted with a claim of, say, poltergeists haunting a house, we do not believe there is a 50-50 chance of it being correct. Our real reaction, if charitable, is "hmm, probably not." We do tend to dismiss offhand such phenomena as human artifacts, and because of good theoretical and inductive preconceptions. It is harmless because no one approaches any subject devoid of preconceptions; we interpret the world through our past experience. On the other hand, "open mind" may also mean an unwillingness to change our mind; to allow our preconceptions to dominate over the evidence. In this sense, the accusation of just trying to debunk is unjustified of the skeptical stance (though surely not of all skeptics). It is not only possible, but the only rational option, to approach a subject with a willingness to change one's mind if the evidence warrants it, but with strong preconceptions about the outcome of our research.

In order to change someone's mind, be it skeptic or believer, one would have to change a large chunk of that person's web of belief. Part of the baggage of past experiences would have to be reinterpreted with wholly different explanations, explanations that are alien to that person, forcing him or her to throw out some of that person's bona fide experiences and reinstate some previously thrown out as artifacts. And that is a very difficult thing to do.

The fact that theories are incomplete and inconclusive, that observation is theory-dependent, and that beliefs are tightly knit into a web does not in any way imply that there is no way to decide between worldviews, much less that all theories are equally good, or that the scientific narrative is just one among many possible ones, or any such nonsense. On the contrary, it is precisely because knowledge is tentative and correctable that we must check and double-check our explanations, and cast, from time to time, a doubtful glance at our pet theories. But this does mean that there are no knockout punches in epistemology. The only way to proceed is one on one, infinitely patient rational debate . . . with sharp, well-calibrated, evidence-based debate tools. □

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Mickey Mouse Discovers the 'Real' Atlantis

PAUL S. HARDERSEN

In anticipation of its most recent animated movie, Disney Enterprises and ABC Television aired a reality-based television show (*Voyage to Atlantis: The Lost Empire*, on Sunday, June 10, 2001) that boasted of "proof" of the existence and discovery of the mythical island of Atlantis. Hosted by actors Tom Skerritt and Melissa Joan Hart, viewers were told that Atlantis has been found and that the lost civilization had a profound impact on human civilization.

The evidence brought forth in the show included reliance on the writings of Plato about Atlantis, the similarities in the rituals and writings of different cultures on both sides of the Atlantic as evidence of the widespread impact of the Atlantian civilization, seemingly "advanced" technology that has been found from ancient times, and recent expeditions that claim to have found Atlantis.

Much of the beginning of the show dealt with a discussion of Plato's conception of Atlantis in *The Republic* and other works. Although Plato was a philosopher, there was an implicit assumption in the discussion that Plato is referring to an actual place. Paraphrasing Plato's writings, several interviewees on the show described the philosopher's vision of Atlantis as a kind of paradise and "perfect civilization." Robert Sullivan, a senior editor from *Time* magazine, stated, "It [Atlantis] was the best and the brightest of Earth at that time...an advanced civilization . . . something of an Eden on Earth." Descriptions from several other "experts" painted a scene of an idyllic, technically advanced civilization that was destroyed because they were living in a way that displeased their gods. More paraphrasing from Plato told of the people of Atlantis becoming "debased," "decadent," "arrogant," and "rapacious." Evidently, destruction came quickly and the entire island society sank in a day.

Besides the storybook-like features of Plato's writings and the very moralistic tones used, the assumption that Atlantis was a real place and civilization is far from certain. According to Joseph Manning, an assistant professor of classics at Stanford University, ". . . the story is a fiction intended to instruct Dionysius II of Sicily of what would happen if he continued on his political course . . ." (personal communication). Nevertheless the show's use of Plato and the "lessons" from the Atlantis story played heavily throughout the show.

The "Evidence"

Much of the show was spent presenting evidence of Atlantis as an "economic powerhouse" around 9600 B.C., serving as a locus for civilizations on both sides of the Atlantic to visit and conduct trade. Similarities in different civilizations on both sides of the Atlantic—from pyramids and their construction techniques to archaeological finds and DNA testing—were used to bolster the so-called "Trans-Atlantic Connection" that suggests that the civilization of Atlantis spread to the lands along the Atlantic Ocean.

Comments by several of the interviewees, including three authors of different Atlantis books, described recently found artifacts that are a few thousand years old. These discoveries suggest, according to the show, that the Atlantis civilization was much more technologically advanced than previously depicted. The show pointed to societies with flushing toilets, hot and cold running water, an ancient "computer," batteries, electricity, and possibly even aviation. Specific references were presented to the "Baghdad Battery" that may have been used for electroplating, the 2,000-year-old "Antikythera mechanism" used for astronomical observations, and pyramid wall drawings of objects that are claimed to be electric lights.

The last part of the show dealt with other potential locations for Atlantis, such as the Azores, the mid-Atlantic Ocean, and the island of Thera. All of these ideas were dismissed, with emphasis on removing the Minoan civilization on Thera (Santorini) as the likely origin

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of the Atlantis myth. Atlantis—revealed in the show to be none other than Cuba—was said to have been destroyed through the impact of a comet on or near the island. Evidence for this impact consisted of legends from American aborigines and the Carolina Bays—assumed to be impact craters from the comet.

The show concluded with Taffi Fisher Abt, director of the Mel Fisher Center, suggesting that a treasure-hunting group actually found the central city of Atlantis off the coast of Cuba.

Bad Science

Critiquing the show from the viewpoint of a physical scientist, the common notion that Atlantis "sank" is geologically implausible; islands simply do not float on the ocean's surface.

The use of a comet impact as a destruction mechanism, coupled with the show's claim that this impact had global implications and caused Earth to come out of the Ice Age, is not supported by any physical evidence. A cursory look at the geologic history of Cuba shows no evidence for the expected geologic deposits that would easily be found if a sizeable impact had occurred on or near the island only 12,000 years ago (Palmer 1945).

A large, geologically young impact crater would be fresh and would quite likely have been found by now, as the ocean floor has been globally imaged at high resolution.

As supporting evidence, the Carolina Bays and their presumed cometary impact origins were brought forth to bolster the notion of an impact near Cuba. Scientific investigation of the Bays has been conducted since the 1930s. A good overview of the current state of knowledge of large impacts can be found in the work of French (1998). Terrestrial explanations for the Bays seem to be currently more prevalent as seen in the work of Grant et al. (1998). Even if the Carolina Bays were authentic impact craters, it would be difficult to use them as corroborating evidence of an impact off the coast of Cuba where the main impact crater does not seem to exist.

Many of the other claims in the show have either been found to be hoaxes, are misleading, or have been exaggerated. A strong effort was made to convince viewers that advanced technology existed long before our time. However, a little research shows that examples cited in the show are neither advanced technologies, as we would commonly think of them, nor anything beyond the capabilities of the people of those time periods. One example put forward is a fraud: The stone cylinder with hieroglyphic symbols found in Davenport, Iowa, has been extensively documented as a nineteenth century fraud (McKusick 1991).

Another factual lapse in the show involves the use of DNA testing of Egyptian mummies that purportedly found traces of nicotine and cocaine from the remains of the mummies. The show claimed that this finding is inconsistent with the knowledge that coca and tobacco were only found in the Americas at that time. While stating that coca and tobacco plants were only found in the Americas is correct, DNA testing does not have the ability to detect compounds such as nicotine and cocaine. DNA typing or fingerprinting uses sequences of unused DNA strands to identify individuals.

A "Roman terra cotta head" was used to imply that trans-Atlantic crossings in ancient times were more frequent and widespread than previously known. However, scholarly research only suggests that the head is evidence of the occasional, possibly accidental, Atlantic crossings made by some Old World vessels (Hristov and Genoves 1999). One interpretation suggests the head to be of Roman origin and made between the second and third centuries A.D. (Hristov and Genoves 1999). This find is still the subject of debate within the archaeological community, but that controversy has nothing to do with the "fantastic speculations" (Hristov and Genoves 1999) made about transoceanic crossings—one of which involves Atlantis.

The ancient, 2,000-year-old "computer" found off the coast of Antikythera in 1901 does exist and is thought to have performed astronomical calculations such as showing the position of the Sun throughout the year, displaying the changing lunar phases, and indicating the positions of bright stars and constellations (Price 1959). Although considered to have been a relatively complex gearing mechanism compared to other devices at the time (Price 1959), it is a significant stretch to say that this device compares favorably to today's technology.

Based on the descriptions of the mechanisms and the materials used in their construction, it seems plausible that the mechanism could have been made within its cultural context. However, the show did not consider this alternative view. Instead, the author of *Lost Cities of Atlantis*, David Hatcher Childress, claimed that finding the Antikythera mechanism was "like finding a jet airplane in the tomb of King Tut." Not to be outdone, the next scene immediately showed Hart, who strongly suggested that—because of the so-called advanced ancient technology presented in the show—it was quite reasonable to think that ancient civilizations had the capability of flight. The evidence? Two "petroglyphs" in South America that Hart claimed can only be seen from the air.

Media Irresponsibility

Emerging from the half-truths and misleading statements, larger issues must be explored. The first involves the responsibility of the media when it comes to airing shows that come across as documentary and "reality-based" productions. The unchallenged claims of shows such as this can be easily accepted by an audience that is not used to questioning authority or employing their critical thinking skills. Television networks should be held to a higher standard of accountability, but it is also the responsibility of the viewers to be more skeptical of their television programs.

Another issue deals with how documentary television shows are created, edited, and produced. Based on personal communications with some of the people interviewed for the ABC/Disney

Atlantis show, it seems likely that at least some of them were not accurately informed concerning the content, purpose, and conclusions of this show. Some stated that they were interviewed for hours on a wide range of subjects, only to be later edited down to sound bites that *were taken out of context and used solely* to promote the overall purpose of the television show. For example, Joseph Manning said, "I thought I was doing a serious documentary on Atlantis . . ., [but] I got sliced to bits and was used as a lead in to suggest that the Egyptians had electricity, among other nonsense!" (personal communication). Taffi Fisher Abt said that she "never implied it [Atlantis] was near Cuba. . . . That was an assumption made by the shows producers" (personal communication).

Of course, money is the primary motivating factor for airing the show. Its appearance on ABC, which is owned by Disney, less than a week before the opening of the animated movie of the same name, suggests that ABC/Disney wanted to whet the appetites of the moviegoing public.

In summary, the efforts by ABC Television and Disney Enterprises to *"prove" that they have found Atlantis* have fallen short. The evidence cited in this show is weak, open to alternative interpretations, suffers from plausibility arguments, and is either misleading or fraudulent. Though ABC and Disney may claim that the show is nothing but "entertainment," it again raises the issue of media responsibility when they air television shows that make incredible claims without substantial, verifiable, and supportable evidence.

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Atlantis Behind the Myth: No Way, No How, No Where

KEVIN CHRISTOPHER

Scholars and skeptics who would concede that there is any fact at all behind the Atlantis legend usually argue that the ancient Greek philosopher Plato has dimly recalled a Bronze cataclysm in the Aegean Sea, either on Crete or Santorini. Yet all the evidence shows that Plato's Atlantis account is beyond a doubt entirely fictional—a utopian myth concocted to vividly illustrate Plato's political philosophy. Atlantis is first mentioned in two dialogues written by Plato, the *Timaeus* and the *Critias*. Before Plato, there are absolutely no references in any literature anywhere to the alleged civilization, an absence from the literary and mythological traditions of ancient Greece that speaks volumes.

In the *Timaeus*, Plato presents a dialogue between Socrates, Critias, Hermocrates, and Timaeus. The latter three are obliged to repay Socrates for his masterly discussion of the ideal society in *The Republic* by giving accounts of their own. Critias retells a story of Atlantis he claims to have heard when he was ten years old. His grandfather—the elder Critias—relates this story to the younger Critias and others at a poetry recital competition on *Koreotis*—"Children's Day"—during the Athenian festival of *Apatouria*. In the dialogue *Critias*, he continues his account of Atlantis, giving further details about the origins of the society, the geography, and the culture. The dialogue then cuts off abruptly. This break is taken to coincide with Plato's death.

In the *Timaeus*, Critias claims that his grandfather, the elder Critias—by then ninety years old—heard the story from his own father, Dropides. Dropides in turn heard the story from the revered Athenian poet and statesman Solon. Ultimately, Critias attributes the story of Atlantis back to priests of the Egyptian city of Sais. He alleges that Solon, during his travels in Egypt, met with these clerics. The sages astounded him with an account from hoary antiquity about the lost Atlantean civilization. They told

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how Athens waged war with Atlantis 9,000 years before Solon's time—circa 10,000 B.C., far older than any evidence modern archeologists have thus far found for civilization in the Mediterranean Basin, or anywhere in the world for that matter.

Plato's account is unambiguous, placing the existence of Atlantis at circa 10,000 B.C. It also clearly accounts for the alleged provenance of the Atlantis story up to Plato: priests at the Egyptian city of Sais keep the historical written records of Atlantis lore for 8,000 years before Solon hears the tale. Without question, there simply were no Egyptian writings, priests, nor civilization 10,000 years ago.

Relocating Atlantis

In 1969, Greek seismologist Angelos Galanopoulos first proposed that catastrophic eruption of the volcanic island of Santorini (Thera) in 1500 B.C. was the source of Plato's Atlantis. After all, Santorini is a half-sunken caldera, and a buried city that perished in the catastrophe—Akrotiri—was uncovered on the island by Greek archaeologist Spyridon Marinatos in 1967. He forced the date of the ancient Santorini eruption to jibe with Plato's story of Atlantis by arguing that Plato had his dates wrong by a factor of ten: the lost civilization was submerged 900, not 9,000 years, before Solon. According to Galanopoulos, the confusion of hundreds and thousands was a mistake of translation between Egyptian and Greek. Yet the fact remains that Egyptologists have never found *any* Egyptian texts that record the Atlantis legend, regardless of its alleged age, in Sais or anywhere else.

Furthermore, Galanopoulos has fallen into a typical pitfall. He changes the definition of Atlantis in order to prove its existence. Equating Atlantis with Santorini, Galanopoulos fiddles with the location and the date, begging the very question of whether Plato's, rather than Galanopoulos', Atlantis really existed. In his book *Imagining Atlantis* (1999), Richard Ellis aptly quotes late CSICOP Fellow L. Sprague De Camp: "You cannot change all the details of Plato's story and still claim to have Plato's story. That is like saying the legendary King Arthur is 'really' Cleopatra; all you have to do is to change Cleopatra's sex, nationality, period, temperament, moral character, and other details, and the resemblance becomes obvious."

Critias was quite clear about date of Atlantis; he was also clear about the location: it lay in the ocean outside of the Pillars of Hercules (Benjamin Jowett translation):

> [24e-25b] . . . For the ocean there was at that time navigable; for in front of the mouth which you Greeks call, as you say, "the pillars of Heracles," there lay an island (i.e., Atlantis) which was larger than Libya and Asia together; and it was possible for the travellers of that time to cross from it to the other islands, and from the islands to the whole of the continent over against them which encompasses that veritable ocean. For all that we have here, lying within the mouth of which we speak, is evidently a haven having a narrow entrance; but that yonder is a real ocean, and the land surrounding it may most rightly be called, in the fullest and truest sense, a continent. . . . Of the lands here within the Straits they ruled over Libya as far as Egypt, and over Europe as far as Tuscany. So this host, being all gathered together, made an attempt one time to enslave by one single onslaught both your country and ours and the whole of the territory within the Straits. . . .

The claim of Atlantis's location is fairly precise: The Mediterranean is the "haven" with a "narrow entrance." Atlantis lies outside of the Mediterranean "at a distant point" in the Atlantic ocean. Atlantis is not on Santorini. It is not on Antarctica, as Canadian librarian Rand Flem-Ath speculates. Nor is in modern-day Bolivia, or, more specifically, a submerged volcanic island in Lake Poopo on the Bolivian highlands, as John M. Allen, author of *Atlantis: The Andes Solution*, would have readers believe.

Plato's Use of Fiction

Plato's dialogues expound his philosophy. One of the ways in which he conveys his ideas is through the use of extraordinary tales asserted as truth. Towards the end of the *Gorgias*, for example, Socrates retells a story of the Isles of the Blessed and Tartarus (Greek versions of heaven and hell). At the end of *The Republic*, Socrates tells the story of Er, who, severely wounded in battle, has a near-death experience and comes to, finding himself on a funeral pyre (fortunately unlit).

As the philosopher Karl Popper notes in the first volume of his two-volume series *The Open Society and Its Enemies* (1962), Plato sees legends about the origins of a people, moral fortitude, and great achievements as socially useful indoctrination tools—noble lies. Clear examples of this doctrine abound in *The Republic*:

> [Republic 376] In this education, you would include stories, would you not? . . . These are of two kinds, true stories and fiction. Our education must use both and start with fiction. . . . And the first step, as you know, is always what matters most, particularly when we are dealing with those who are young and tender. That is the time when they are easily moulded and when any impression we choose to make leaves a permanent mark. (Desmond Lee translation)

The context of the festival during which Critias hears the story from his grandfather is telling. The feast of Apatouria involves the induction of infants, youths and wives into the phratry, or clan of families. This is where these social units inducted their next generations into the fold—the very context where education through fictions presented as fact is laid out in *The Republic*.

There is no evidence whatsoever to indicate that Atlantis represented any real place at any time. Where the story contains descriptions or events that resemble historic happenings, it only does so to the degree that any piece of fiction relies on experiences of reality. All of the evidence points to the story being one of Plato's noble lies: useful fictions used to make a point, not to refer to the past. □

Even Better the Second Time 'Round

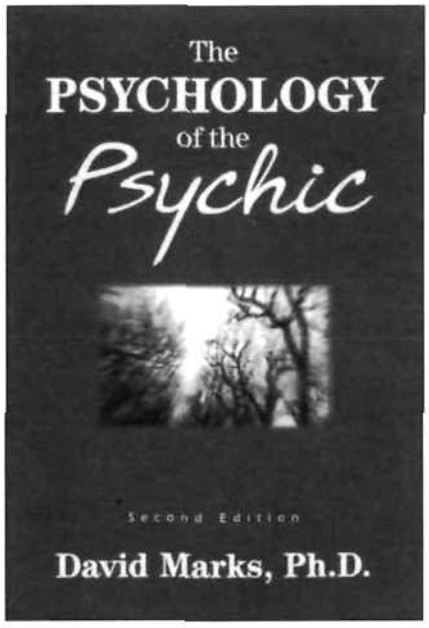
JAMES E. ALCOCK

The Psychology of the Psychic (Second edition). By David Marks. Prometheus Books, Amherst, New York, 2001. ISBN 1-57392-798-8. 336 pp. Softcover, $23.

The original *Psychology of the Psychic* (Marks and Kammann, 1980) is a classic in the field of critical inquiry into parapsychological claims. It not only discussed and critiqued a wide range of supposed evidence for the paranormal, but it also presented the authors' careful exposé of Uri Geller, described their own unsuccessful efforts to replicate some of the key studies in remote viewing, and reported their discovery of crucial flaws in the remote viewing research paradigm. Perhaps even more important, that book was outstanding in its analysis of cognitive factors that are likely to give rise to "psychic experiences"—factors such as population stereotypes, the power of coincidence, illusory correlation, and subjective validation.

It was therefore with some trepidation that I approached this review of the second edition of the *Psychology of the Psychic*, authored by David Marks alone, and dedicated to his original coauthor, the late Richard Kammann. How has he tampered with it, I wondered? Too many "second editions" are simply the same old first editions with an extra chapter tagged on at the end, and with a few new references thrown in to suggest freshness. Would this be the case with this one? Or worse, have important parts of the book been cast aside to make room for new material? I feared that any fiddling with the original would only lead to disappointment.

My fears were for naught. Almost all the original book has been retained with only minor editing. The only major deletion is the material dealing with The Amazing Kreskin (two chapters), eliminated on the grounds that Kreskin's "psychic" magic act is no longer relevant to the study of the paranormal, a view shared by this reviewer. A full third of the material in the second edition is new, and it not only updates the original, but it presents a critical analysis of areas of parapsychological research that have come into prominence since the original book was published.



My aim in this review is in part to assess the value of the changes that have been made to the original. However, given that that book appeared over twenty years ago, many readers of this review, unfamiliar with the original, will want to know about the value of the new edition as a whole. Therefore, I have tried to provide information on both old and new in this review. I have organized the review around the key themes of the book.

Cognitive Psychology

The material on cognitive factors underlying supposed psychic experiences has been strengthened in this new edition by an excellent new chapter about the emotional impact of personally relevant coincidences, which Marks refers to as "personal oddmatches." This chapter, plus the information which derives from the original, makes an important contribution to our understanding of why so many, many people are convinced about the reality of the paranormal on the basis of their own experiences, experiences that seem to them to defy any rational explanation. The reader is offered a valuable lesson in how to minimize the likelihood of being misled by others' claims or by one's own experiences.

Remote Viewing

Still included in this book is the original

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definitive critique of the Targ and Puthoff remote viewing (RV) studies that had at their outset persuaded many people, both within and outside parapsychology, that good evidence had finally been gathered that would establish the scientific validity of psychic phenomena. Those remote viewing experiments typically involved this procedure: A subject and an experimenter sat in a room that had been constructed to be impervious to electromagnetic energy. A second experimenter then travelled to a target site, a geographical location that had been randomly selected from a set of twelve possible targets. Once enough time had elapsed for the second experimenter to reach the target site, the subject was asked to report whatever sensations he or she was experiencing. This procedure was repeated a number of times, each time with a freshly selected target. At the end of the series of trials, the transcripts of what the subject had said on each trial were given to a group of independent judges, along with the list of the targets that had been used, and the judges then visited each target site and rank-ordered the subject's various descriptions in terms of how well they corresponded to the site. On this basis, highly significant correspondences between descriptions and targets were found, and this was the case for a number of different subjects.

Having suspected that the fly in the ointment was in the judging procedure, Marks and Kamman requested copies of the original transcripts from Targ and Puthoff, in order to see whether there were cues in the transcripts that would bias the judging. In this new edition, Marks reports that now—twenty years later—this request has never been answered, a serious omission on the part of anyone claiming to be a scientific researcher. However, they were able to obtain these transcripts in a roundabout way, from a consultant to the project. They discovered that comments made by the experimenter to the subject, and which were included in the transcripts, clearly indicated where in the overall series a given session fell, and that this information could cue the judges, who were given a set of targets in the order that they had been presented, to correctly match the subject's descriptions to the targets. Indeed, when Marks and Kamman had their own research participants try to match which response went with which target, they had no problem in doing so. However, when these cues were edited out, such matching did not surpass a chance level. This was skeptical inquiry at its best, and through it, Marks and Kammann effectively demonstrated that the Targ-Puthoff research had been so poorly controlled that their data could not be taken seriously as evidence for the existence of paranormal processes.

In this second edition, in a new chapter entitled "The Sloppiness Continues" (he doesn't mince words!), Marks brings us up to date regarding subsequent research that attempted to replicate the Targ and Puthoff findings. Marks reports that, to this day, "Well-controlled experiments never find the RV effect, while poorly controlled experiments nearly always do. Data suppression, flawed methodology, and lack of replication lead to the conclusion that Targ and Putoff's RV effect was a cognitive illusion, an artifact of human error and wishful thinking" (68).

This should write "Closed" to the Targ and Puthoff era of parapsychological research.

Marks has added two chapters on other, more recent, remote viewing research, focusing on the so-called "Stargate" research conducted between 1985 until 1995, under the direction of parapsychologist Edwin May, and sponsored by the Defense Intelligence Agency (DIA) of the United States government. The thrust of the research was to try to demonstrate that remote viewing could be harnessed for intelligence-gathering purposes. Marks finds good reasons to be deeply troubled by the Stargate research, not the least of which was the refusal by May to allow him to have access to the raw data, or to the names of significant participants in the research, or to do his own independent judging of the Stargate transcripts. Mark concludes that, "In all probability, the data collection procedures and the data themselves are faulty and do not support what is claimed for them. Unfortunately, we will probably never know for sure" (82).

Uri Geller

In the original edition, a full five chapters were devoted to the feats and exploits of Uri Geller, the "superpsychic of the seventies." All five chapters are fortunately retained, virtually unchanged but for minor editing. Geller had not only thrilled much of the world with his "psychic" powers, but he had made considerable inroads in terms of persuading some members of the scientific community—whom we might have been expected to know better—that his feats were paranormal in nature. One of the key achievements of the book was to show how one can apply a version of the control group, so commonly used in experimental methodology, to the analysis of the claims of supposed psychics. Marks and Kammann observed Geller during his tour of New Zealand, but he refused their invitation to submit to their proposed controlled tests, and so they used what they called delayed control groups, groups of presumably nonpsychic subjects who were instructed to attempt to perform a specific psychic feat that had earlier been performed by Geller. For example, whereas Geller astounded many people by his reproductions of drawings contained in sealed envelopes, the authors found that some of their subjects could match Geller's performance, without need of paranormal ability. (Obviously, delayed control groups cannot be expected to rule out all fraud, because many fraudulent methods are known only to professional conjurers, and in such cases, control groups would be unable to match the performance of a psychic using such methods.)

To these five chapters, Marks has

added an additional chapter of new material on Geller, unabashedly entitled "The Great Psychic Lie." This chapter not only brings the reader up to date on Geller's activities, but also addresses the distortions and lies that characterize what Marks calls "the new religion of the paranormal," and provides trenchant commentary on New Age religion in general. In Marks's view, this new religion of the paranormal, "... is totally fake. It has untrustworthy prophets, phony miracles, and foundations of quicksand. Unproven claims cleverly mask the truth with false doctrines about nature's workings that distort unsuspecting perceptions of reality. New Age prophets exhort their sheeplike followers to carry out all sorts of home truths that beggar the imagination of any thinking person." Marks's style of writing is a joy, and the price of the book is almost justified by that paragraph alone!

Other New Material

Marks has added several other new chapters dealing with parapsychological research that has occurred since the original edition was published. There is a chapter on Ganzfeld research, another paradigm that promised the breakthrough into scientific respectability that parapsychologists have so long sought. This chapter focuses particularly on the controversy over the quality of the Ganzfeld research, including the famous exchange between Ray Hyman and Charles Honorton in the *Journal of Parapsychology*, and the later exchange between Hyman and Daryl Bem in the pages of the prestigious *Psychological Bulletin*. Marks concludes that the twenty-five years of Ganzfeld research, like other parapsychological research before it, has failed to demonstrate the existence of any paranormal effect.

Another new chapter is devoted to psychic staring, the supposed phenomenon whereby people claim that they can "feel" when someone is staring at them from behind. This "phenomenon" has recently been garnering the attention of some researchers, Rupert Sheldrake in particular. Marks reviews the available research, and concludes that claims that people can detect unseen staring have not been substantiated.

In another new chapter, Marks discusses the supposed "sixth sense" of animals that reputedly helps them to find their ways home after having been abandoned miles away, in unfamiliar surroundings. He concludes that there are many anecdotes but no solid evidence to support the psychic pet hypothesis.

This is an excellent book—and I must say, it is actually an improvement on the original. Not only does the new material add to its value, but the physical presentation is also much improved: This book is visually more attractive, both in terms of the cover, the typeface, and the quality of paper. More important, new headings have been inserted into the material carried over from the first edition, providing an easier read, and, unlike its predecessor, this book has an index.

In conclusion, whatever your approach to the paranormal—be it as skeptic, believer, agnostic—you should read this book. For those who have the original, read the new chapters, both for the information contained and for Marks' style of writing ("So British!"). For those unfamiliar with the original, you have a treat waiting for you!

Psychoanalysis: Anything There?

PETER LAMAL

How To Make A Paranoid Laugh: Or, What Is Psychoanalysis? By François Roustang (Translated by Anne C. Vila). University of Pennsylvania Press, Philadelphia. 2000. ISBN 0-8122-3525-8. 182 pages. Hardcover, $17.50.

Some belief systems never die, such as creationism. Acceptance of other belief systems declines, but they linger on indefinitely, witness psychoanalysis.

Many critics of psychoanalysis have argued that it is not a science, and they will not get any argument about that from François Roustang. Says he: "If we wish to speak correctly of psychoanalytic epistemology, we must recognize that our belief in no way helps to give the fiction [of psychoanalysis] a scientific status." For Roustang it is an "elementary observation" that psychoanalytic theory is a mythology. Furthermore, this observation is systematically ignored in psychoanalytic circles.

Another attack on psychoanalysis by another benighted outsider? No. Roustang is a distinguished French psychoanalytic clinician and theorist. And he says that the theoretical texts of psychoanalysis should unequivocally be classified as mythologies. Such texts do not help psychoanalysts in their practice "and they turn psychoanalysts into the faithful adherents of a sect whose obscurantism rivals that of some religions or political ideologies." What a stunning admission. Is there any other discipline in which foundational texts are so denigrated by a member of the discipline? How can there even be a discipline if there are no texts to guide and promote further development of theory and practice? Roustang says that psychoanalysts "carefully avoid wondering about the foundations of our knowledge." But psychoanalysts, in my view, are not unique in that regard.

In his discussion of the importance of

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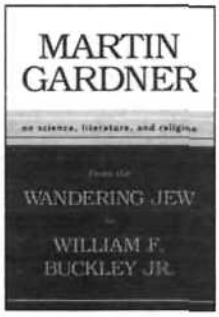
epistemology, Roustang uses the example of the widely accepted "obvious fact" of the unconscious to point out that it is not an obvious fact. He says that most of the time we forget, as Freud often did, that the unconscious is a hypothesis. We erroneously "assume it to be the effective agent of all aberrant processes. And then . . . we try to make it express itself . . . we establish the laws of its functioning, we give it a theory." But all of this is epistemologically illegitimate. It is an epistemological blunder, "a methodological absurdity" to speak of knowledge of the unconscious. The correct stance, says Roustang, is not that Freud discovered the unconscious, but that "Freud invented the unconscious in order to account for certain facts."

Cure, says Roustang, might have served as "the functional index" in the field of psychoanalysis. But since psychoanalysis (at least of the Lacanian variant) has been detached from the notion of cure, "it is now floating unanchored." Elsewhere, Roustang asks where the effectiveness of psychoanalysis lies. He says that this question is basic and, "like all basic questions, it is undoubtedly insolvable." It is thus not surprising that the chapter "The Effectiveness of Psychoanalysis" has nothing to say about how effective psychoanalysis is. Two points: The effectiveness of psychoanalysis is assumed, not demonstrated; and unlike other approaches to human behavior, psychoanalysis assumes that the causes of any efficacy it may have cannot be ascertained. You cannot get much less scientific than that. But, says Roustang, "for the French facts don't have very much importance; what matters is that the theory can retain its prestige." This book is turgid and heavily metaphorical. In my view, it obscures the fact (as Gertrude Stein said of Oakland): "There is no there, there."



Lucid Commentaries with Something to Say

MARK DURM

From the Wandering Jew to William F. Buckley, Jr. By Martin Gardner. Prometheus Books, Amherst, New York. 2000. ISBN 1-57392-852-6. 350 pp. Hardback, $27.

> "From time to time, when the impulse sizes me, I sound off about topics of interest to me, and respond to requests for book reviews if I think I have something significant to say about a book."

So begins Martin Gardner in this book, his latest of many. We, the readers, should always be thankful when Gardner "sounds off" on topics and has "something significant to say" about any book. Gardner's lucid style, eloquent wit, and carefully researched writings makes him one of America's foremost essayists. In this latest offering of essays and book reviews, Gardner explains that "the topics of this rambling anthology are mainly attacks on bogus science and what I regard as religious superstition."

Why does the Jew wander? Because Jesus says in Matthew 16:27, 28 "Verily I say unto you, There be some standing here, which shall not taste of death, till they see the Son of man coming in his kingdom." To Bible fundamentalists, everything in the Bible must be literally true—therefore, if Jesus said there were "some standing" there who would witness his second coming—then there must be a Jew or Jews who are alive today who were alive when Jesus uttered these words—wandering and waiting for his second coming. Gardner relates the different wanderings this myth has taken through the ages.

Another essay is entitled "The Incredible Flimflams of Margaret Rowen." Margaret Rowen claimed to be the God-chosen successor to Ellen White, the Adventist leader and prophet. Gardner adeptly reveals her claims to be false and she a liar and con artist. The sad story of Bert Fullmer, a long-time believer and proponent of Margaret Rowen, is the central character in a related but different essay. Fullmer defended Rowen only to be shown as a complete fool—something he realized toward the end of his misled life. A third essay dealing with Margaret Rowen is "The Comic Pratfalls of Robert Reidt." Reidt led a little band of Rowenite disciples in Long Island, New York. He led them to believe Rowen's date of February 6, 1925, was the real date for Jesus' second coming. Since Jesus didn't show, he then predicted September of 1925. Since Jesus didn't show then either, he then predicted New York City would be destroyed by fire from heaven on February 6, 1926. Nothing happened on February 6, 1926, in New York City—well, that is, there was no fire from heaven. Reidt then predicted the fire would hit the city in the early morning hours of February 12. It didn't, and Reidt faded into obscurity.

The final three essays are not about religious belief but literature. One deals with *John Martin's Book*, a forgotten children's magazine. Another is about L. Frank Baum, the author of the Oz books, and the final one is about Hugo Gernsback, the father of American science fiction. I'm glad the impulse seized Martin Gardner to "sound off about [these] topics" also.

The reviews of books are all very enjoyable and educational. The topics run the gamut from physics to reincarnation, to crystal balls, to Jim and Tammy Faye Bakker, to Christian Science, to the meme (which is supposedly anything humans do or say that is

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The Young Skeptics Program

In an effort to promote science and skepticism among all generations, the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP), is pleased to announce the launch of the Young Skeptics Program. The Web-based program is geared towards students, parents and educators.

CSICOP.org/youngskeptics

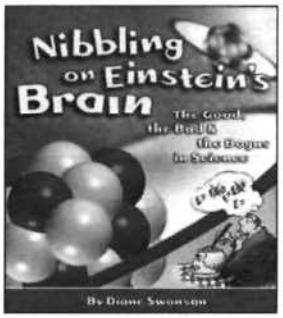
The goals of the Young Skeptics Program are:

- To promote science and skepticism within all facets of society and among all generations.
- To provide multiple outlets for young people to learn and involve themselves in science, skepticism, and critical inquiry.
- To work with parents, teachers and students in an effort to promote learning, defend and advance science education, and encourage critical thinking in all areas of life.
- To help young people make sense of the world by developing the tools and gathering the information to navigate through the nonsense effectively.
- To nurture curiosity, wonder, and the imagination while sharing in the fascination of reality and the excitement our universe has to offer.
- To explore extraordinary claims and investigate unexplained phenomena, while enjoying ourselves in the process.
- To inspire future generations to proudly carry the torch of science and reason and keep the flame burning bright for years to come.

For more information please contact Program Director Amanda Chesworth at **a.human@mindspring.com**

not genetically determined but is transferred from person to person by imitation), to *The Scarecrow of Oz*, and finally to the surprisingly very fundamentalist faith of William F. Buckley, Jr. There are nineteen of them, and when Gardner writes a book review he does have "something significant to say" and each is much more than just a review. He tends to give a biographical sketch of the author, events surrounding the publishing of the book, and a thoroughly researched commentary that gives the review a breath of life.

Even though some information is repetitive (understandable since these essays and book reviews were originally written at different times for different publications), this latest book from Martin Gardner is a good read.



Skepticism on the Half-Shell

BENJAMIN RADFORD

Nibbling on Einstein's Brain: The Good, the Bad and the Bogus in Science. By Diane Swanson. Annick Press, New York 2001. ISBN 1-55037-686. 102 pp. Softcover, $14.95.

The bar for children's and young adult's books dealing with critical thinking and skepticism has been dramatically raised with the recent publication of *Nibbling on Einstein's Brain.* This colorful and intelligent book achieves a rare feat for science books: it makes skepticism and science interesting to the lay reader.

Skepticism is not easy and the methods of science not always intuitive or simple. The concepts are derived from many fields, including statistics, psychology, and logic. Swanson has done science and skeptics a great service by making logical fallacies and critical thinking techniques accessible to a wide audience without dumbing down the content. The chapters include Beware of Bad Science (telling good from bad science); Science Watch (how science is done and the pitfalls to avoid); Media Watch (biased and misleading news reporting); Mind Watch (mistakes in logic and self-deception); and Winning Strategies (tips for using skepticism in everyday life). The book also features a glossary, index, quiz, and section on further reading.

Swanson draws upon sources as diverse as Aesop's fables and mathematician/statistician John Allen Paulos for examples, covering everything from failed doomsday predictions to the pseudosciences of graphology and horoscopes. Along the way Swanson has plenty of cartoons and sidebars, and "Your Turn" and "Always Ask" blurbs to actively involve the reader in skepticism.

My greatest concern about this book is that potential readers will be turned off by the format and reject it as just a kid's book. It is not. Though obviously targeted to teens, adults will find *Nibbling on Einstein's Brain* full of interesting tidbits and useful reminders about skepticism and the nature of science. Nonetheless, if you're looking for a great book or Christmas present to buy a child to foster critical thinking skills, this is the one to get.

Disclosure: *Nibbling on Einstein's Brain* is dedicated to the Committee for the Scientific Investigation of Claims of the Paranormal, publisher of the SKEPTICAL INQUIRER. (See the sections on the importance of unearthing and disclosing biases, pages 19 to 21.) □

Benjamin Radford is Managing Editor of the SKEPTICAL INQUIRER.

Listing does not preclude future review.

Facing Up: Science and Its Cultural Adversaries. **Steven Weinberg.** Harvard University Press, Cambridge, MA 02138. 2001. ISBN 0-674-00647-X. 283 pp. $26, hardcover. A collection of the Nobel Laureate physicist's essays over the past fifteen years—each with a new introduction by him, some followed by his responses to criticisms—expressing a rationalist, reductionist, realist, secular viewpoint. Many deal with the follies he has found in the attitudes toward science of many sociologists, philosophers, and cultural critics, and on the tension between science and religion. Notable examples: "Science as a Liberal Art," "The Heritage of Galileo," "The Boundaries of Scientific Knowledge," "The Methods of Science . . . and Those by Which We Live" (which considers the question "Why should the philosophy of science not be of more help to scientists?"), "Night Thoughts of a Quantum Physicist," "Sokal's Hoax," "Before the Big Bang," "The Non-Revolution of Thomas Kuhn," "A Designer Universe?" (published in SI's September/October 2001 Science & Religion issue), and "Looking for Peace in the Science Wars."

Medical Journalism: Exposing Fact, Fiction, Fraud. **Dr. Ragnar Levi.** Iowa State University Press, Ames, IA 50014. 2001. ISBN 0-8138-0303-9. 169 pp. $35.95, paper. A noted medical editor (author of "Assessing the Quality of Medical Web Sites," SI, March/April 2000) here provides a valuable guide for both medical reporters and consumers of medical information on how to tell fact from fiction on the medical beat. The tone is constructive, the goal to improve medical journalism. Issues tackled include getting beyond the hope and the hype, being misled by number games, depending on anecdotes for evidence, failing to question findings about a treatment's effects, extrapolating from research to clinical practice, failing to question findings, assessing the credibility of claims, mistaking risk factors for diseases, misjudging risks, investigating alternative medicine, and scrutinizing arguments and reasoning. With a foreword by Deborah Blum, Pulitzer Prize-winning science journalist.

—Kendrick Frazier

SCIENCE BEST SELLERS

Top Ten Best Sellers in **New York**

1 ***Germs: Biological Weapons and America's Secret War***
Judith Miller, et al.
Simon & Schuster

2 ***Fire***
Sebastian Junger
W.W. Norton & Co.

3 ***Living Terrors: What America Needs to Know to Survive the Coming Bioterrorist Catastrophe***
Michael T. Osterholm, John Schwartz
Dell Publishing

4 ***Biohazard: The Chilling True Story of the Largest Covert Biological Weapons Program in the World—Told from Inside by the Man Who Ran it***
Ken Alibek, Stephen Handelman (Contributor)
Delta

5 ***First Responder Chem-Bio Handbook***
Ben N. Venzke (Editor)
Tempest Publishing

6 ***The Map that Changed the World: William Smith and the Birth of Modern Geology***
Simon Winchester
HarperCollins

7 ***The Universe in a Nutshell***
Stephen Hawking
Bantam Doubleday

8 ***Uncle Tungsten: Memories of a Chemical Boyhood***
Oliver W. Sacks, MD
Knopf

9 ***Fast Food Nation***
Eric Schlosser
Houghton Mifflin Co.

10 ***Marshall Brain's How Stuff Works***
Marshall Brain
Dell Publishing

By arrangement with Amazon.com, October 2001.

'Geology Confronts Creationism': An Undergraduate Science Curriculum

MARK A. WILSON

In fact, we could call the Bible "The History Book of the Universe." It is the only 100% accurate history book in the world!

—Ken Ham (2001)

"Scientific creationism" is experiencing yet another revival in the United States, and science students are again poorly prepared to meet the intellectual and political challenge. It is time to add creationism, and skeptical responses to it, directly to the undergraduate science curriculum.

The creationist activism of the 1980s was dampened by several significant court decisions, and creationists for the most part withdrew from the public arena to concentrate on home schooling and other activities out of the mainstream. The 1999–2000 Kansas episode, where the state school board excised conventional evolutionary theory and the Big Bang from proficiency standards, now happily rescinded, showed a new aggressiveness among creationists. Most still share the goal of removing "the lie" of evolution from public schools and museums, and they have adapted their techniques to the changing political and cultural environments.

Creationists have managed to successfully pursue two separate and in some ways incompatible strands of antievolutionism: the traditional literal interpretation of Genesis (and thus an Earth and universe less than 10,000 years old) and "Intelligent Design Theory" (SI, March/April 2001), which postulates that life is too complex to have appeared by chance alone. They have shrewdly exploited the most effective way to reach today's young people with their message, the World Wide Web. "Scientific" creationists have succeeded in holding their ground with the American public despite decades of debates with scientists: recent Gallup polling shows that 45 percent of Americans believe in a young Earth and a literal Adam and Eve, a number that has not significantly changed in thirty years. Creationists have, through Intelligent Design theory, even managed to gain significant footholds in mainstream academic institutions.

Science students in college tend to be poorly informed about the concepts and politics of scientific creationism, yet many are continually confronted by fellow students, friends, and family about their "beliefs" in organic evolution, a long Earth history, and conventional cosmology. They can usually explain the scientific concepts and evidence well enough, but are then surprised by the detail and sophistication of modern creationist arguments against them. Science students do not have background in antiscience rhetoric, and so they commonly withdraw from conversations and debates, marveling at the irrationality of it all. Unfortunately, this leaves the field to the pseudoscientists, and it deprives the public of a full perspective on the issues.

At The College of Wooster we developed a course specifically for advanced geology undergraduates to confront creationist arguments and evidence in detail. Through this course these students learned the history of creationism and addressed the major arguments, particularly those associated with cosmology, paleontology, and interpretations of the rock record. The course is relatively easy to teach because of the enormous amount of creationist literature available, and it can be adapted for advanced students in other sciences as well.

The "Geology Confronts Creationism" course was developed for students who completed at least two courses in geology. To thoroughly assess creationist arguments and evidence, students needed a moderate amount of scientific background. While the course was explicitly designed to analyze the geological aspects of creationism, its implicit purpose was to provide a thorough exercise in critical thinking, writing, and oral expression.

The course syllabus was posted on the Web, where it still resides (Wilson 2001). Each week we added two or three paragraphs of discussion and links for the next week's topic. Students could access the latest information and ideas, and go directly to creationist and scientific sources. We also had a series of discussion questions posted for each class period's material. Students were required to provide written answers to these questions before each class. Several persuasive essays of various types were

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required during the semester. Each student completed an extensive research project for the class, assessing some detailed aspect of creationist geology. There were also midterm and final examinations which were essentially in-class writing assignments.

Sorting out primary creation models to assess was a surprisingly difficult task. It is one thing to say that the Bible is the "history book of the universe" (Ham 2001), but quite another to move from scripture to a scientific model which does not appear to contradict it. Creationists are well experienced in attacking conventional evolution and historical geology, but have difficulty erecting their own models. All are ultimately forced to account for the apparent vast distances in the universe; the geological record, including fossils; the present and past distribution of organisms; and the genetic history of life itself. It was not surprising to find that there are no comprehensive creationist models, and the incomplete ones that exist are hotly debated among creationists. Students quickly learned that one of the primary political handicaps in the creationism movement is this lack of conceptual unity. Compare, for example, the bitter debates between the "old Earth" and "young Earth" creationists (Ross and Gish 1992), and the complicated theology of the Christian Geology Ministry (Johnson and Johnson 2001) with the simplistic views of the Answers In Genesis organization (2001).

Two outside events were important to the success of the course. Philip Johnson, the most public advocate of Intelligent Design theory, gave a talk at a local university. We attended as a class. Two of my students asked the only negative questions, calling him on his interpretation of the Precambrian fossil record ("There are no fossils prior to the Cambrian Explosion," which is nonsense) and asking his view on the age of the Earth ("I don't have a position on that"). Johnson's angry responses demonstrated better than all his writing how the creation/evolution issue is primarily political and not an example of real scientific discourse.

The second event was a letter I sent to the Answers In Genesis Web site presenting the geological argument that carbonate hardgrounds, a common sedimentary feature, demonstrate that the Phanerozoic rock record could not possibly be the result of a worldwide flood, as believed by young Earth creationists. Hardgrounds are my geological specialty, so I made certain the letter was tightly presented and well referenced. The online response by one of the Answers In Genesis geologists was a model of scientific ignorance and arrogant illogic (Walker 2001), showing students (and many others who logged on) the intellectual bankruptcy of a movement that must confine itself to a literal interpretation of scripture.

The most frequent comment by students evaluating their experience in this course was that it gave them confidence in their abilities to discuss and debate the geological aspects of evolutionary theory, and that they need not fear the glib sophistries of scientific creationists. They could now approach creationism with particular rhetorical skills and arguments, rather than be surprised by it as most scientists eventually are. They also learned that creationism is best answered by making the "scientific" claims of creationism public.

Similar courses can easily be developed in other scientific and social scientific disciplines. Most scientists have for too long either ignored the pseudoscience surrounding their disciplines or supported particular scientific champions to fight the battles. It is time to write our responses to irrationality directly into the curriculum.

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Explaining the Cheese

RALPH ESTLING

> "And yet each denizen of each scale may perceive an appropriate universe with impeccable, but local, factual accuracy."
>
> —Stephen Jay Gould
> *The Lying Stones of Marrakech*

The quotation, near the end of Gould's essay *Room of One's Own*, the last in the book, strikes me as eminently wise, as well as troubling, troubling in the sense that it forces us to think, rarely a welcome exercise.

Are things definable in any truly meaningful way, as factual, or must their fractal forms, the varying scales at which we view and consider them, be held to be paramount? Should we, and if so, how are we to balance the scales? What ought the level of our point of view be pitched at? What, to sum it up and demonstrate the sort of dilemma we're faced with, *is* the true length of Maine's coastline?

All of you doubtless recall the problem the cheesemites faced when confronted with this question and the profound and often violent theological and philosophical contention that raged among them over the nature, origin, purpose (if any), and teleological reckoning of their world, the Cheese they inhabited:

> The cheesemites asked how the
> Cheese got there,
> And hotly debated the matter.
> The Orthodox said it came from the
> Air;
> The Heretics said from the platter.

Ralph Estling writes from Ilminster, Somerset, U.K.

Let's start with something simple, like the universe, and go on to Maine later.

The universe that we perceive has a radius and an age of about 14 billion light years. But, or so it is contended by some cosmologists, our little, local, neighborhood universe is just a mere infinitesimal spatial and temporal blip in the *Whole Shebang Universe* or, as it is sometimes called, *Multiverse*, that exists eternally and infinitely, beyond our perception, and *con*ception, as far beyond as is the nature and relative scale of importance occupied by their cheese within the Total Scheme of Things, as seen and philosophized over by the cheesemites.

As a heretic cheesemite of long-standing I am an implacable plattertudinarian . . . within reason. For example, I'm not quite absolutely sure that *all* the cheese got here by exploding into existence and being from a previous state of total nonexistence and nonbeing, for no reason and caused by nothing at all but just kind of *happening*, you know, one of those things. . . . Of course, if this *is* the case, we can't rightly speak of a *previous* state, since time only began, got under way, when the cheese Big-Banged itself from nowhere at all (for we can't talk of a previous space either), barging into here. You see the problem.

At least the cheesemites could point to the air or the platter as the solution, the operant factor. But Total Absolute Nothingness, is, I can't help thinking, a pretty poor raw material for creating cheese *or* universes out of. So maybe the Whole Shebangers and Multiversifiers are on to something and bits and odd-bods of universes keep blasting their way into existence from within the Whole Shebang Universe they are embedded in, so that *our* Cheese derives neither from the air *nor* from the platter and its coming into being can only be explained by a variety of inexplicable and indefinable hypotheses, none of them likely to be accurate. This puts a damper on things.

What it all boils down to is a question of what, if anything, constitutes "appropriate scale" in determining local (or non-local) factual accuracy. Does it even make any sense to inquire into what is the "real" length of Maine's (or Norway's or any) coastline? For no matter how carefully and precisely we measure it, we can always get it *more* precise by running our tape along every bay, cove, boulder, stone, grain of sand, molecule, atom, proton, quark, and Planck length, until we reach the spacetime foam that the physicists assure us is down there, beyond the 10^{-35} meter mark (I may be off by a few orders of minus magnitude so don't quote me on this).

Of course, it's easy to argue that lengths of space and time are entirely fictitious, that is to say dependent for their existence and meaning on us and

the scale of our measuring devices. This is what most people think Einstein said, making space and time entirely human creations, things which don't really exist in their own right but only as adjuncts to humans and their observations, measurements, and philosophies. Even the cheesemites knew better than this. The cheese, whatever it was and wherever it came from, was not their creation, nor were they imagining it. One has to be quite an intelligent human being in order to fashion solipsistic nonsense of the kind we make. Men, no less than cheesemites, are creatures of their universe, not creators of it. Let us move on.

So it turns out that scale, the level on which we view reality, is important, but only to us. Sir Arthur Eddington, one of the greatest physicists who ever lived, and one of the most confused, is famous for having proved the accuracy of Einstein's claim about the bending of light by gravity when observing a solar eclipse on a little island off West Africa, and for propounding the dual nature of physical reality, the reality of scales. A table is in fact two tables, he asserted, the semi-real shadow-table we see and touch and bump into via our very imperfect senses, and the Actual and Absolute Table of Ultimate Reality that is constructed out of quantum particles and the forces acting among them.

This is nonsense of course, for it assumes that scale is what determines what is and isn't real. There is only one table and what differs is our definition of it, our definition being contingent on our choice of scale of perception and conception, not the other way round. The macroscopic table and the submicroscopic table are the same table; what differs is our viewpoint, our scale and level of reference when we consider the table. Tides and waves aside, the coastline of Maine is not variable; what varies is the means by which we choose to measure it and the arbitrary scale those measurements take. This is so obvious it needs a profound intellect to fail to see it. No cheesemite has the mental capacity to make such an egregiously stupid and elementary error, the error of believing that the scale of perception determines the nature of the thing perceived. Cheese is not cheese because it is quanta?

As some microscopic Thomas Henry Huxley-amid-the-cheesemites might have put it: I would rather be a tiny, insignificant insect living out my minuscule life in a slab of moldy gorgonzola, in total and abject ignorance of the whole, vast universe going on around me, than be a man possessed of the gift of Reason, and use that Reason as we so often see it used, by the most talented and noble minds that Humanity has to offer. . . .

O.K. Now let's hear it for the cheesemites. □

SI: In Need of a Psychic

ALAN MILLER

Once again a year has passed. Once again predictions made by the world's best psychics have been disappointing (see January/February, 2001 SI, pp. 7–8). And, predictably, SI has once again failed to see that what appear to be failed predictions are nothing of the sort. Indeed, they can be easily explained in at least two ways.

When not in a trance or divining the future for SI, *Alan Miller is a professor of behavioral science at Hokkaido University in Sapporo, Japan. (He submitted this in early 2001—really!—but unfortunately we've only now been able to schedule it. —Editor)*

Simple misunderstanding (referred to by psychics as "Occam's rationalization") is probably the simplest, and therefore, best explanation. Psychics operate on a different plane than others, and their predictions are therefore often misinterpreted or misunderstood. For example, if a psychic predicts that aliens will abduct O.J. Simpson, and this event does not *literally* come true, simple-minded skeptics might interpret this as a failed prediction.

Of course the psychic, operating at a higher level of consciousness, is speaking metaphorically, and the above prediction should be properly understood as

meaning that Hillary Clinton will become senator of New York. (The symbolic message, which is clear to those who do not have preconceived biases against prognostication, implies that a controversial public figure will achieve something extraordinary and will "rise above" all others.) The conscientious psychic will, after the fact, correct the misunderstandings of cynical lay observers, but such explanations are typically dismissed as post-hoc contrivances. Alas, for those who believe, no explanation is necessary, but for those who do not, no explanation will suffice.

The conscientious psychic will, after the fact, correct the misunderstandings of cynical lay observers, but such explanations are typically dismissed as post-hoc contrivances.

A second explanation for supposedly failed predictions comes straight out of basic physics. This should come as no surprise since the word *physics* is an anagram for the word *psychics* (with an extra "c" inserted since psychics are "seers"). As anyone familiar with Einsteinian physics or *Star Trek* knows, time is relative. Although people observe time as marching along in a linear fashion and at a constant rate, this is merely true from our limited point of view. Psychics do not have such limitations, therefore, even though they might claim to make predictions for a specific year (they must talk in ways that lay people can understand), their concept of what constitutes a year is freed from the shackles of nonambiguity. Thus, I have every confidence that the prediction that Pope John Paul II will die is true and accurate, once the subjective time constraints imposed on us by our position in the universe and sensory limitations have been removed. And I have not even mentioned the idea of parallel universes! Are you people at SI scientists or what?

The main point of my writing this article, however, is not to criticize SI. Rather, I offer constructive advice. SI does not run its own predictions of future events: bold predictions on issues that have a profound effect on people's lives, such as which actor and actress will marry, divorce, or be abducted by aliens. No wonder subscriptions lag far behind the *National Examiner*.

Fortunately, a careful reading of the pseudoscience literature suggests that psychic abilities can be developed by anyone. It's just a matter of openness to the forces that surround us all, and tapping our unrealized potential. After all, we all know that humans use only 5 percent of our brains. The rest is filler (like network news). But of course it is *not* merely filler. It is "Sentient Hyperactive Integrative Telepathy" (often known by its acronym). And with some practice, anyone can learn to tap it (or fling it).

I have emerged from a long trance and am ready to offer my predictions for the year 2001. I realize that we are already well into the year, but even with the limited time, I am confident my predictions will outperform those of other psychics. Here, then, are my top ten predictions. (I have made far more, but due to limited space, they will not be printed here. However, rest assured that at the end of the year, I will tell you what the other predictions were.) Also, please note that I will not resort to imprecise and ambiguous predictions, unless of course it improves my chances of success.

1. A major astronomical discovery will lead to a new theory concerning the universe. Nothing wishy-washy about this prediction. Indeed, to clear up any possibility of misunderstanding, I will define each term precisely. A discovery is deemed "major" if it is covered in one or more newspapers. And when I say the universe, I am not merely referring to *any* universe. I am referring precisely to *our* universe. (No other psychic goes to such lengths to clarify his or her predictions!)

2. Arnold Schwarzenegger will make a firm decision to enter politics. Again, there is nothing ambiguous about this prediction. Note, however, that I am not sure whether or not he will actually tell anyone what his decision is.

3. The Pope is "on his way out." No doubt.

4. Hillary's political career will cause a strain on her relationship with Bill.

5. A terrible earthquake will hit India. I know what you're thinking: the earthquake already happened. Blame SI for this. They are late in publishing these predictions. But rest assured that I made this prediction just hours before the earthquake hit.

6. An ethnic-based war will break out somewhere in the world, and the U.S. will refuse to send troops. Once again, I am being as precise as possible. No only do I predict a war, but one where the participants have different ethnic backgrounds! I further predict that, not just any country but specifically the U.S., will not commit troops. I realize I am going out on a limb making such a bold prediction, but I feel awash in Sentient Hyperactive Integrative Telepathy.

7. One of the new "reality-based" television shows will be rocked by a scandal. There is nothing, of course, that purveyors of these shows (as well as their audiences) hate more than a scandal, but one will occur anyway.

8. Tiger Woods will not be able to duplicate the success he had in 2000. (Okay, I admit that this is not a psychic prediction. I teach statistics and am well aware of "regression toward the mean.")

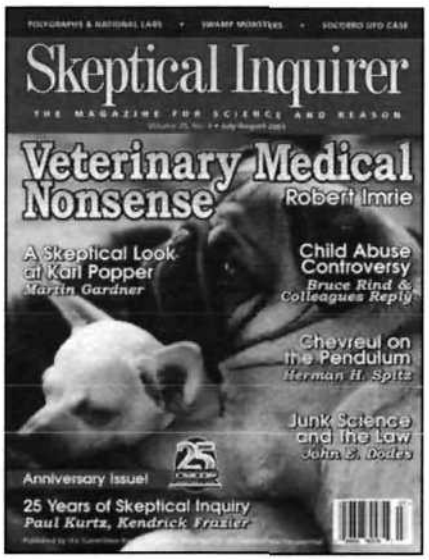
9. Death will once again rock the entertainment industry. It brings me no joy to make such a prediction. I sometimes feel this newfound ability of mine is more of a curse than a blessing!

10. Martin Gardner will publish a new book.

Well, there you have it. And I will stick by these predictions (as well as those that I have not yet told you about), regardless of the consequences. (Are there consequences for failed predictions?) □

Alternative Veterinary Medical Treatments: A Misrepresentation?

KAREN R. MUÑANA



I read Robert Imrie's article "Confronting Veterinary Medical Nonsense" (July/August 2001) with astonishment after realizing that a presentation I made at a national veterinary conference was a subject of the article. Regrettably, Imrie misrepresented several facts regarding my presentation, which I shall clarify here.

First, I am a veterinary neurologist, not an internist as Imrie states. Contrary to what Imrie implies in his article, the focus of the presentation was not acupuncture, but rather vagal nerve stimulation and the ketogenic diet, two alternative treatments for seizures which are deemed efficacious based on sound scientific evidence. Although I did briefly address acupuncture, that part of the presentation was essentially comprised of a literature review of the topic; it did not institute a specific stand on its merits. (I myself do not practice acupuncture, nor do I regularly recommend it to my clients.)

The statements that Imrie attribute to me purporting the benefits of acupuncture can be found in the conference's proceedings, yet I consider it troublesome that he omitted all my statements regarding the uncertainties and inconsistencies present in the available information on the use of this modality. For instance, I highlighted the only controlled study undertaken in humans that failed to document a beneficial effect of acupuncture, and questioned the value of available veterinary information on the topic because of the lack of controlled studies.

It seems ironic, at best, that the goal of Imrie's group "is to help animal owners and veterinarians understand what they are being told, and to help keep them from drowning in a vast sea of medical misinformation," given that his misrepresentation of my presentation is contradictory to these goals. I am fortunate that the readers of this magazine, being critical thinkers, are well suited to question the accuracy of Imrie's comments. I would be happy to send a copy of the proceedings in their entirety to any interested party.

Karen R. Muñana, DVM, MS,
Diplomate ACVIM (Neurology)
Associate Professor of Neurology
North Carolina State University
College of Veterinary Medicine
Raleigh, NC 27606

Robert A. Imrie Responds

Muñana claims I have unfairly criticized her because the focus of her presentation on "Alternative Approaches to the Treatment of Epilepsy" was "not acupuncture, but rather vagal nerve stimulation and the ketogenic diet." In her published notes, and as I recall in her lecture, she devoted roughly equal time and attention to each of these "alternative" approaches. I could not discern any indication that "the focus" was intended to be on two of these modalities to the exclusion of a third. The published description states: "This presentation will review the use of these three alternative therapies in humans with epilepsy, and discuss their current or potential use in the management of seizures in veterinary patients." In any case, I'm sure Muñana would agree that any material presented should be accurate and reflect the best available science.

Unfortunately, the presentation in question included several inaccurate statements regarding the history of acupuncture. It also included the positive results of two severely flawed clinical trials involving not acupuncture, but the implantation of gold beads in dogs. Even though both suffered from a number of major shortcomings that were not mentioned, it stated that "the main criticism of these clinical studies is the lack of a control group." It concluded that "nonetheless, the positive response reported in these studies suggests that this form of therapy may be of use." Elsewhere it stated that "the mechanism by which acupuncture controls seizure activity is not completely understood." But acupuncture has not been definitively shown to control seizure activity. Likewise, the presentation asserted that "one major advantage of acupuncture treatment is the absence of side effects," when the more salient disadvantage is that it has no proven above-placebo or beyond-counter-irritant therapeutic effects at

all. Adverse effects certainly have been reported in people, and animals may not like the insertion of needles. (H. Yamashita, H. Tsukayama, A.R. White, Y. Tanno, C. Sugishita, E. Ernst. Systematic review of adverse events following acupuncture: The Japanese literature. *Complement Ther Med*, 2001 June; 9[2]:98–104).

In short, notwithstanding the fact that Muñana expresses reservations about the evidence, I believe the presentation substantially "oversold" both the history and the likely benefits of acupuncture in the treatment of epilepsy. Subsequently, at least one additional negative clinical trial in humans has been published (K. Stavem, R. Kloster, E. Rossberg, P.G. Larsson, R. Dahl, E. Kinge, R. Lossius, K.O. Nakken. Acupuncture in intractable epilepsy: Lack of effect on health-related quality of life. *Seizure*, 2000 September; 9[6]:422–62).

In my view, the quality of science and evidence supporting vagal stimulation and the ketogenic diet in the treatment of epilepsy is vastly higher than that supporting the use of acupuncture (or gold bead implantation.) They aren't in the same scientific league, much less the same ballpark. Proponents of acupuncture have endlessly repeated inaccurate and overblown historical claims supporting its allegedly "time-tested" and venerable nature without bothering to check original ancient Chinese sources. They also tend to publish studies and clinical trials of abysmally low quality, concluding that the results are either positive or "inconclusive, but promising" and calling for bigger, better, and more expensive ones. I believe Muñana has been the unwitting victim of these trends. It's unfortunate that in her presentation she chose to lump all three of the modalities in question together as "alternatives" to standard therapy. □

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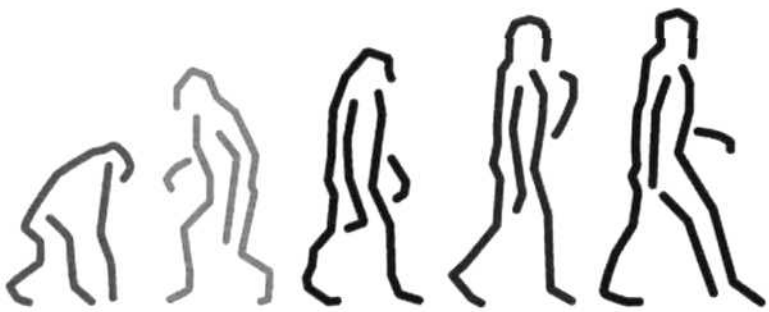

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Our Science and Religion 2001 issue (September/October 2001), as expected, prompted considerable reader response. Selected letters are in this Reader's Forum section. We could not publish nearly all the letters received, and most of the letters published have been shortened, some significantly. Letters about the overall issue, or commenting on the topic generally, appear first, followed by those that respond to individual articles, essentially in the order in which the articles appeared. We thank you for your insights and interest.

— Kendrick Frazier, Editor

The Overall Issue

I've been a reader of the SKEPTICAL INQUIRER for many years. The last one on science and religion was by far the best ever produced.

Ivan Stanko, M.D.
pego.rh@worldnet.att.net

Please remove me from your subscription list immediately and refund the balance of the price paid. . . .

I would deduce from the combination of your magazine's title and its content that what you are "Skeptical" about is anything religious and what you are an "Inquirer" of is anything that flies in the face of religion. . . .

From the tone of your "Special Issue," it seems that any chance to take some murky data thrown out by well-meaning Christians and represent it as mainstream is the norm. Looking for data that might show correlation between God and science seems way beyond your level of thought (or at the very least, desire). I make this assertion because there is plenty of data out there showing correlations if a person would simply inquire.

Mark A. Rudge
Atlanta, Georgia

What a magnificent piece of work is the September/October issue on Science and Religion! Alas! It was too good not to be perfect. Far too little was said by the contributors about the *purposes* of these disciplines.

The objective of science is simple and fairly clear; to increase knowledge of natural law in order to serve man's needs whatever they may be. (Lord save us from labeling scientists as "truth seekers.") Would that equal simplicity applied to religion.

One would love to believe that the good rules of religious faith, not so readily obtained from science, are there to help mankind live in peace and harmonious brotherhood. Unfortunately the holy revelations are encumbered by a distinctly different collection of directives that make the good harvest conditional upon acceptance of gods indistinguishable from egotistical intimidators who love to pit one ethnic group against another over pieces of real estate and other material objects.

If we could but learn to separate the wheat from the chaff all would not be lost. Learning how to make that selection is the essential ingredient in the evolution of the best old religions and well worth the effort, for science alone has not proven to be exactly the path of peace. . . .

We need to be careful. In ridding religion from the supernatural let us not throw the baby out with the bathwater.

Bernard Smith
Boca Raton, Florida

I think you shouldn't publish religious articles. In fact, long ago I got the distinct impression that your policy was to avoid religion; but obviously either I was mistaken, or you've changed.

I also subscribe to your sister publication *Free Inquiry*, and I get all the religious articles I want from them. In fact, I'm rather puzzled as to why "Science and Religion" is a SI special issue rather than a *FI* one. You're poaching, and I'd like you to stop it. . . .

Ralph Sizer
Providence, Rhode Island

I think there is serious conflict between science and most religions.

Some people insist that it is impossible to disprove the notion of a god. This may be true for gods in general, as the definition is so vague. . . .

What couldn't exist (and is internally contradictory) is the notion of an omniscient, omnipresent, omnipotent God. The idea that the first creature in the universe was the most complex creature is counter to proven evolutionary principals. That this creature created itself, then created the universe is scientifically absurd. The Jewish/Christian/Muslim concept of God/Allah arose from previous religions, but has been more successfully promoted.

As science has advanced, more and more topics previously considered beyond the mortal mind have come to have natural explanations. . . . Without science there is only superstition. Thank you for your excellent publication. Keep up the good work.

Rick Lewis
Bellevue, Washington

The special issue on science and religion seems to have largely bypassed the actual contemporary issues that concern the partisans in the Science and Religion discussions—Protestant fundamentalist Christians excepted.

But at least in Europe and the Anglo-American countries, people don't look to religion to function as science. They expect their churches to provide some community and some guidance on moral and ethical issues, but not to ward off thunderstorms or cure their illnesses. More people look to quack "alternative medicines" to fix their ailments than to religious faith-healers.

And, to a large extent, science has won its old conflict with religion. In the democratic West, nobody goes to jail for blasphemy or for criticizing the teachings of their church. True, many issues such as abortion and stem cell research still arise that find religious figures taking opposite sides from scientists. But those battles are

largely mediated through secular government institutions.

Bruce Miller
Oakland, California

I was very surprised by the narrow-mindedness of the science community as printed in the Science and Religion 2001 issue. It proves that intellect does not breed common sense. Science is so proud of being able to explain thunder and lightning, but has no clue as to the creation of thunder and lightning.

Science seems to be on the defensive when its references to religion have to be combined with the supernatural, and references to God come from Galileo and Newton. It's too bad your publication didn't contain the thoughts of modern theologians who, like science, are constantly updating translations and proofs.

It's also too bad that such learned men claiming to be skeptics cannot accept the fact that much of our existence and world depends on faith and always will. Faith will never be documented with mathematical precision, but, in my mind, surely provides me answers through prayer. You can't look at the heavens at night, a newborn baby, and the diversity and perfect functionality of nature and tell me their existence "just *is*" and has nothing to do with the creative hand of God.

Robert M. Moyle
Avon Lake, Ohio

While I greatly enjoyed your recent special issue on science and religion . . . I was disappointed to see you perpetuate the "love your neighbor because water freezes at thirty-two degrees" brand of nonsense that holds that there is a scientific basis for ethical conduct.

Can anyone give me the scientific basis for stopping to help a wounded mugging victim instead of just walking on? You can tell me that I am obligated to help him because it will help to continue our species, and this is the highest goal. I respond by saying that our species, with its teeming billions, is in no way imperiled by the loss of this man's life. . . . You can tell me that it is a self-evident truth that altruism is morally better than selfishness. I respond by saying that this may be so; but what does it have to do with science? . . . I am not advocating that theology replace science in any particular area of life. I am just stating the obvious by saying that science cannot provide the impetus for moral conduct.

Andrew Ditch
Geneva, New York

Frazier's 'Introductory Thoughts'

I enjoyed Kendrick Frazier's "Introductory Thoughts" in the Science and Religion 2001 issue.

I graduated from UCLA with a degree in anthropology over twenty years ago. Now it seems as I get older the answers to life's great mysteries get simpler and less complicated. Leslie White, in his book *The Evolution of Culture*, states that the defining characteristic of man is the ability to make and use symbols. Religious behaviors are symbols displaying group affiliation. The need to belong is far greater than the need to reason and understand.

Science and religion are two different animals. Science is a means to an end. It is a method of discovery. Religion is belonging to a group. That is it in a nutshell.

Jack Edwards
Conroe, Texas

The last place I expected the word *atheist* to be pejorative was in the SKEPTICAL INQUIRER. It starts with Kendrick Frazier's notion that "theists" and "atheists" are equal fringers:

> Evangelical and fundamentalist believers see a black-and-white world. They know the truth. . . . Atheists are equally certain of the correctness of their non-belief, and everyone else is deluded or at least a bit foolish.

We have often heard in the SKEPTICAL INQUIRER and elsewhere that "extraordinary claims require extraordinary proofs." Is there anything more extraordinary than the claim that a supernatural power created and controls the universe? The evidence that supports this theory is hearsay anecdotes going back thousands of years. Stories of individuals who attribute some recent event to the Supreme Being can offer no evidence they have ever had any visual or audio contact with the supernatural. "Theists" prefer to rely on their overwhelming number of supporters rather than the quality of their evidence. . . .

Sam Fields
Plantation, Florida

I am in complete agreement with Kendrick Frazier's "Introductory Thoughts" about science and religion.

But I am dismayed that he would use this vehicle to slam my legal profession. He says that Phillip E. Johnson "distorted, trivialized, and mischaracterized" evolutionary science and that his "rhetoric" and "tactics" were "honed in the legal arena."

To begin with, Mr. Johnson is a law professor. Unlike other professions, the law is unique in that its teachers only rarely ever try cases or argue appeals. My guess is that Mr. Johnson has spent very few hours of his professional life in a courtroom.

After almost fifty years of practicing law, I know that distortion, trivialization, and mischaracterization are extremely poor techniques to use before judges or jurors. Those who do use them are rarely successful.

Ronald A. May
Little Rock, Arkansas

Tyson's 'Holy Wars'

Neil deGrasse Tyson ("Holy Wars") correctly reports the results of a recent survey that showed that about 39 percent of scientists are religious. This deserves some clarification.

The survey, which I assume was the one performed by Edward J. Larson and Larry Witham (*Nature* 386:435–436, 1996), reported on belief by scientists in a personal God. This was narrowly defined as belief in a God to whom one prays and from whom an answer is expected.

An entirely different result was obtained in a follow-up study by the same authors (*Nature* 394:313, 1998) when they surveyed "greater" scientists, a group defined as members of the National Academy of Sciences. For that elite group only 7 percent indicated a belief in a personal God. Among these leading scientists, biologists show the lowest belief (5.5 percent) and mathematicians the highest (14.3 percent).

To explain the great skepticism of leading biologists, my tentative guess is that their confident understanding of the mechanism of evolution undermines reliance on a supernatural theory to understand the living world. Like Laplace they can say, "I have no need for that hypothesis."

Irwin Tessman
Biology Department
Purdue University
W. Lafayette, Indiana

I enjoyed Neil deGrasse Tyson's article but puzzled over two points. The first was concerning the percentage of scientists who claim to be religious. I suspect that if the definition of "religious" included a belief in an "intelligent, omnipotent God figure in human-like form," the percentage of religious-believing scientists would drop substantially.

Second, Tyson's statement "the methods of science have little or nothing to contribute to

ethics, inspiration, morals, beauty, love, hate, or esthetics" is rather shortsighted. I lecture to plastic surgery residents concerning facial beauty and stress that the universal standards of beauty (symmetry, averageness, uniqueness, youthful/healthy appearance and pleasant demeanor) have been determined by natural selection. Their origin and purpose can be better understood and appreciated by the "methods of science" that Tyson claims "have little or nothing to contribute." We humans too often assume that ethics, inspiration, morals, beauty, love, hate, etc., are "God given" and not a natural part of nature as expressed by biological evolution. In fact, all the blunders and achievements of humankind have natural origins. There can be no other cause, unless of course, you believe in God.

Craig Gosling
Indianapolis, Indiana

Neil deGrasse Tyson repeats a commonplace myth in lay understandings of the history of science of which skeptical readers should be aware. He states on p. 26: "the time-honored, Earth-centered model had conflicted with no known observations. This remained true long after Copernicus introduced his Sun-centered model of the universe a century earlier" than Galileo's trial. This is not true. For Ptolemy's model had long been known to be a failure in explaining the lunar motion: his incorporation of complex epicycles in describing the Moon's position created a scenario that entailed the Moon's apparent size should vary quite noticeably, but observations refute this variation (the actual variation is much smaller), and this was a thorn in the side of Ptolemaic theory since its inception. Only an elliptical system would have worked (it could have saved even a geocentric model), yet that was not arrived at even by Copernicus, whose own model was actually not much better at predicting planetary motion than the Ptolemaic one, though it did explain one peculiarity: it made more sense of the fact that all the planetary orbits are inclined to the ecliptic just like the Sun. . . .

Richard C. Carrier
New York, New York

Pandian's 'Dangerous Quest'

In his article, "The Dangerous Quest for Cooperation Between Science and Religion," anthropologist Jacob Pandian commends a book by historian of comparative religions Wilfred Cantwell Smith (whom he misnames William) as supporting the idea that "religion" (Latin *religio*) is a pseudoscientific subset of a culturally universal "supernaturalism," a subset fomented by the Church in the Middle Ages. But in making this claim Pandian gets more than Smith's name wrong.

Smith's *The Meaning and End of Religion*—the text in question—nowhere mentions "supernaturalism" and specifically points to the medieval period as one in which the church paid *little or no* attention to the word *religio*, let alone using it to redefine supernaturalism as having scientific legitimacy, as Pandian asserts. Changes in *religio* of the sort Pandian seems to have in mind came, instead, after the Reformation, Smith makes plain, and especially with the seventeenth century and the Enlightenment. But these changes had to do with attaching *religio* to systems of propositional "belief," a point of Smith's which Pandian totally ignores.

Such sloppy scholarship does no service to the skeptical cause. Nor, more generally, does having special issues on "Science and Religion" with zero participation by anyone possessing credentials in the academic study of religion. Does skepticism really need to load the dice against religion by portraying it in ignorance of its actual history?

Daniel C. Noel
Pacifica Graduate Institute
Carpinteria, California

Jacob Pandian replies:

A careful reading of W.C. Smith's book, The Meaning and End of Religion, *and a careful reading of my paper will show that the thesis that I presented in my paper is* not *a restatement of what Smith wrote in his book. I state Christianity established an epistemological link between science and supernaturalism by conceptualizing religion as the framework to explain natural phenomena and to explain the nature of the relationship between God and humankind. In such a view, the religious framework of Christianity was aligned with scientific naturalism, and non-Christian supernaturalism was aligned with superstition.* Nowhere have I said that Smith uses the term supernaturalism.

Smith refers to Saint Augustine's use of the concept of religio, *and notes that after Saint Augustine the concept was not elaborated upon until the Late Renaissance "partly, perhaps, because of the victory of the Church and the disappearance of those alien traditions and of the conflict with them. . . ." The problem of defending Christianity as the true religion arose, once again, in the context of the Late Renaissance when European supernaturalism came into contact with (and was threatened by) other forms of (non-European) supernaturalism, and a proliferation of treatises on Christianity as the true religion emerged, subsuming scientific knowledge (produced by modern science) within the framework of religion. I suggest that Saint Augustine articulated the Christian (i.e., Catholic) views of religion as a combination of true knowledge and faith in the true God and provided an epistemological foundation for the Christian-scientific truth, a foundation that has continued to the present day, causing confusion in the minds of scholars and laymen alike as to the objectives of supernaturalism and science. The late anthropologist Professor Edward Norbeck pointed out in his book,* Religion in Primitive Society, *"We may note in passing that when we speak of the primitive world it is permissible in any civilized company to refer to supernaturalism. With reference to our own society, however, it is often regarded as a mark of militant atheism to refer to our religious beliefs as supernaturalism." I suggest that irrespective of whether it is emotionally pleasing or not, it is necessary to identify Christianity as a particular type of supernaturalism in order to further the objectives and scope of science rather than attempting to bridge supernaturalism (of any type) and naturalism.*

I regret very much and apologize to the readers for referring to W.C. Smith as William Cantwell Smith. As Daniel Noel has noted, W.C. Smith is indeed Wilfred Cantwell Smith, and I thank him for pointing this out in his letter.

The article by Jacob Pandian shows a serious misunderstanding of the history of religious expression. Pandian asserts (with no support other than a reference to a single, academically suspect book) that: "While ancient civilizations such as the Greeks, Romans, Chinese, and Hindus had elaborate beliefs and activities that we associate with supernaturalism, they did not have 'religion,' i.e., a formulation that combines scientific knowledge and supernaturalism." Based on this mistake, he suggests that religion—by which he means Christianity—

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SEPTEMBER/OCTOBER 2001 (vol. 25, no. 5): Special Issue: Science and Religion 2001. Holy wars, *Tyson* / The dangerous quest for cooperation between science and religion, *Pandian* / Design yes, intelligent no, *Pigliucci* / A way of life for agnostics?, *Lovelock* / Science, religion, and the Galileo affair, *Moy* / The god of falling bodies, *Stenger* / The relationship between paranormal beliefs and religious beliefs, *Sparks* / Science and religion in an impersonal universe, *Young* / Arthur C. Clarke's 'Credo,' *Clarke* / A designer universe?, *Weinberg* / An evolutionary-genetic wager, *Avise* / Shroud of Turin scandals, *Nickell* / Multiverses and blackberries, *Gardner*.

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was originally formulated to co-opt science, and that it still persists in this project.

In the Hellenistic and Roman worlds there were always intimate ties between religion (or supernaturalism), science, and philosophy. The Christian Church fathers simply adapted (and generally trivialized) what was already there. The simplest example is astronomy/astrology/cosmology. In the ancient world the Ptolemic system was the final synthesis of theoretical attempts to "save the appearances." That is, to produce a means of calculation of planetary positions that reproduced observations. But there was no assumption that this was a veridical model of reality. The assumed model of reality was Earth at the center of the concentric planetary spheres. In the outermost sphere of the Empyrean the Universal Logos resided and controlled events on Earth by radiating its influence across the planetary spheres. Each of these spheres would, it was supposed, impress its own influence on this radiation, giving theoretical support to astrology as the study of planetary influences on events on Earth. Ptolemy was a master astrologer as well as an astronomer. . . .

At least within the educated elite of the ancient world, supernaturalism and science were not at all separate.

Today, in contrast, dogmatic fundamentalism fails to respect science and dogmatic scientism denies any validity to religion. What is important is to discover a new unity that simultaneously respects the independent rationality of science and nourishes the transcendent potential of the human spirit. This is the reason to work for a reconciliation between science and religion.

Burton Voorhees
Edmonton, Alberta, Canada

Jacob Pandian should know that one cannot win a deductive argument simply by arguing about the definition of a word. However true Pandian's history of the origin of the word *religion*, twentieth century usage is quite different. The Free Religious Association was founded in 1867, providing a focus for Unitarians without creed, including those who denied the existence of God. Roman Catholic theologian Fulton J. Sheen published *Religion Without God* in 1928. Mason Olds writes, ". . . by 1929, the expression 'religion without God' was a favorite subject for discussion" (*American Religious Humanism*, Revised Edition, 1996, p. ix).

The contest between religion and science is not about *religio* versus science. Science won that contest hands down with the publication of *The Origin of Species* in 1859, the outcries of biblical literalists notwithstanding. The contest today is whether religion in the broadest sense is in conflict with science or provides a valid additional path to understanding. This seems to be the agenda of the Templeton Foundation. This contest is worthy of the attention of our best minds today.

Oakley E. (Lee) Van Slyke
San Clemente, California

Jacob Pandian's dissertation on the dichotomy between supernaturalism and science was, overall, very informative. However, there seems to be a major sticking point in his arguments. Pandian maintains that the term *religion* can be appropriately applied only to Christianity because Christianity is the only set of supernatural beliefs that tries to explain natural phenomena. On the contrary, many, if not most, supernaturalisms (as Pandian calls other religions) have myths to explain such natural phenomena as the creation of the world, the northern lights, why the harvest wasn't very good in a particular year, etc. Indeed, the word *myth*, which the author himself uses in relation to non-Christian supernaturalisms, implies a story that attempts to explain some natural phenomenon.

The figure of the shaman or medicine man, found in one guise or another in many cultures, clearly blurs the line between science and the supernatural. Picture the image of such a healer, applying a poultice of herbs (science/technology) as he or she intones a prayer to some Great Spirit (the supernatural)—all in hopes of healing some natural ailment.

Christianity may have pursued a more systematic attempt to explain the natural world vis-a-vis a supernatural dogma, but Pandian overstates his case when he suggests that there is some qualitative difference between Christianity and other religions. Indeed, his view almost smacks of a kind of perverse culture-centric arrogance.

Alan Miesch
Rochester, New York

Pigliucci's 'Design Yes, Intelligent No'

Massimo Pigliucci says that William Dembski "admits that his Intelligent Design could even be due to a very advanced extraterrestrial civilization, not to a supernatural entity at all." Pigliucci seems to have chosen his verb under the assumption that Dembski's only motivation in writing as he did was to convince his readers that God designed Earth's animals. It clearly was not.

Pigliucci's observation that Dembski claims that his "explanations . . . should be allowed in . . . public school curricula" is very much to the point. Dembski realizes that Supreme Court decisions have barred supernatural explanations from public schools and so wishes to provide some natural basis for his explanations. He chooses one that is transparently unbelievable in the hope that while he persuades officials that "intelligent design" can be legally taught, he at the same time can persuade students that only an omnipotent God could credibly be the real source of the "design."

His ploy cannot work. Reference to a "very advanced extraterrestrial civilization" inevitably raises the question of the origin of the members of that civilization. If their origin is supernatural, then so is the foundation for his theory of Intelligent Design and it is therefore not legal to teach Dembski's theory in the public schools. If their origin is not supernatural, then the very advanced extraterrestrial civilization's origin must have been natural, albeit extraterrestrial, evolution. . . .

Stan Kurzban
Chappaqua, New York

I was a little surprised to see that Massimo Pigliucci was not certain of what the intelligence in Intelligent Design is for William Dembski. If one reads Dembski's book *Intelligent Design* (subtitled "The Bridge Between Science & Theology") it is clear that the Christian God is the intelligence that Dembski has in mind—see especially chapter 8. As Pigliucci noted at the start of his article, Intelligent Design is just another brand of creationism; and of course creationism is not about little green men but the Christian God.

Dene Bebbington
Reading, England

Thank you for the splendid issue on Science and Religion, especially the essays which point out forthrightly that these two activities are fundamentally and utterly incompatible.

As a biologist I am delighted with Pigliucci's paper. Thanks to him for the clearest explanation of Aristotle's four causes I have read.

I must courteously disagree with him, however, on use of the word *design* in biology. *Design* inescapably implies a Designer. The *Oxford English Dictionary* tells us that the noun means

"I. A mental plan . . .

1. A plan or scheme conceived in the mind and intended for subsequent execution; the preliminary conception of an idea that is to be carried into effect by action; a project.
2. Purpose, aim, intention.
3. The thing aimed at; the end in view; the final purpose.
4. Contrivance in accordance with a preconceived plan . . . preconceived purpose; spec[ifically] used in reference to the view that the universe manifests Divine forethought and testifies to an intelligent Creator. . . ."

These meanings are taken from actual uses of the word *design* in English from the sixteenth century to the present time.

The *O. E. D.* also gives the history of the English word, which is derived from a fifteenth-century French ancestor meaning "design, purpose, private intention, or determination."

It is clear that in English a "design" has always been the product of a creative and directing mind. In no sense can Darwinian selection, or any other natural process, involve "design." The word is entirely inappropriate for use in the natural sciences. At best it is misleading; at worst it plays into the hands of the creationists. "Structure" is a good substitute, with minimal teleological content.

Thanks again to Pigliucci for his stimulating and lucid article.

James F. Waters
Department of Biological Sciences
Humboldt State University
Arcata, California

I enjoyed Massimo Pigliucci's article, but I contend there is a significant flaw in the notion of the four types of design. It seems to me that none of the four types of design are necessarily irreducibly complex, because the intelligent designs generally build on previous designs.

The example used to represent an intelligent, natural (human) design was the Brooklyn Bridge. It is definitely not irreducibly complex. The design was the result of thousands of trials (and some spectacular failures) in previous bridge designs. It is a fine example of evolution by artificial selection. Just because it can't reproduce by itself (fortunately), doesn't mean it's not an evolving design. The name of the design is really "bridge," with the Brooklyn Bridge merely as the particular example.

You could take off the Brooklyn Bridge's asphalt, remove half of the cables, make the piers a little narrower, make the span shorter, and you would still have a quite viable bridge. In fact you'd have a bridge much like previous bridges that had been built. Those previous designs were less well adapted to the particular New York environment than the Brooklyn Bridge design is, so the builders didn't use them, but in other situations they were quite acceptable. You could change the materials, reduce the width, change the details, and you'd eventually work your way back to the original bridge—a tree tipped across a stream.

Saying the Brooklyn Bridge is irreducibly complex is like saying the human eye is. Just as half an eye was useful to previous organisms, a less than Brooklyn Bridge is, and was, also useful. We have to remember in discussions like this that individuals don't evolve, designs (species) do.

Rick Lewis
Bellevue, Washington

Massimo Pigliucci lays out four different kinds of design. He also states:

> The reason intelligent-supernatural-sloppy design is not distinguishable from some instances (but by all means not all) intelligent-natural design is Arthur C. Clarke's famous third law: . . . the technology of a very advanced civilization is essentially indistinguishable from magic. . . . I would be very interested if someone could suggest a way around Clarke's law.

One way to determine the presence of a supernatural agent would be to look for violations of basic physical laws, such as mass-energy conservation, or causality (except as may be allowed by quantum mechanics). If the violation is blatant enough, the characterization of the event is sufficiently accurate, you could be fairly sure it was a supernatural event, and not some new physics at work. Of course, no such event has ever been reliably documented.

While the lack of such extra-physical evidence would not prove that the cause was natural, I would think that only an exceptionally disciplined or sneaky god could pass up the opportunity to break a law of physics now and then. If such an agent were never to violate physical law, then it may as well be natural.

Leon Towns-von Stauber
Shoreline, Washington

Massimo Pigliucci notes that it would be interesting if "someone could find a way around Arthur C. Clarke's law" which states that "from the point of view of a technologically less advanced civilization, the technology of a very advanced civilization is essentially indistinguishable from magic." There is a simple way around it. Stop assuming that the less advanced civilization is less advanced than ours and contains a dearth of rational beings. If today's eminent scientists and rational thinkers encountered a civilization much more advanced than ours, the last thing likely to cross their minds would be that they were seeing magic. They would more likely be enthralled and excited to learn about untold wonders and expand their knowledge of physics and other sciences. This assumes, of course, that they can get past their bruised human egos!

Michael Uschold
Seattle, Washington

One need not go through fancy shenanigans to refute the notion of Intelligent Design. We need only consider extinctions. There have been about six major extinctions discovered in the geologic record. Let us consider only the last two.

The most recent major extinction event occurred 65 million years ago. It wiped out more than 70 percent of the species extant at the time. The one before that, about 280 million years ago, annihilated upwards of 90 percent of the extant species. This means that about 3 percent of species managed to pass through those narrow gates. If we now add the previous extinctions, it is obvious that much less than 1 percent of the species which have existed on Earth have disappeared forever. We are the accidental result of an enormous number of accidental events in geological history, and evolutionary history.

So here we have an example of an "intelligent designer" who deliberately destroyed more than 99 percent of his "models." I can see not the slightest hint of intelligence here. In fact I agree with the great theologian Woody Allen, who said: "If there is a god, he is an underachiever."

R. Thomas Myers
Kent, Ohio

Moy's 'The Galileo Affair'

Timothy Moy's article "Science, Religion, and the Galileo Affair" is presented as a cautionary tale about the boundaries between religion and science, and "the false belief that expertise in one grants an authority to speak in the other."

Is he referring to the Church's crossing the boundary by telling Galileo what he could and could not say about celestial mechanics? Er, no. It seems the shoe was on

the other foot. It was Galileo who was the transgressor of boundaries, says Moy.

Why, the scientist actually had the effrontery to think that his expertise qualified him to tell the Pope he was wrong about the way heavenly bodies moved. Moreover, Galileo had the nerve to think that "science had to replace theology as the Church's principal mode of understanding." Small wonder, says Moy, "that the Inquisition dropped the hammer on him." I guess the jerk had it coming.

Moy casts Galileo in the role of the crackpot pseudoscientist, and Pope Urban VIII as the skeptical debunker. It seems Galileo's proof that the Earth revolved around the Sun wasn't rigorous enough to satisfy the good Pope, so he forbade him to promote heliocentrism as a true description of the heavens.

Apparently, the Church's demand for scientific rigor did not extend to the geocentric theory, which remained the official Church view of reality because it was supported by the Bible. Meanwhile, as Moy points out, much of the Church hierarchy already believed in heliocentrism because it was empirically the most accurate hypothesis on which to base the Church calendar!

Jeff White
Toronto, Ontario
Canada

Timothy Moy paints the Roman Catholic Church as a patient, understanding institution that was attempting a compromise with Galileo. It was not. Read the transcripts of the trials and hearings which are available and it is evident they wanted to shut him up even if it meant killing. His friendship with the Pope was the only thing that saved his life.

Moy is correct when he states "For most of the medieval and Renaissance periods . . . the primary supporter of research and teaching in the sciences was the Roman Catholic Church." This is a spin put on by modern theologians. The Church was the only act in town, so any progress that was made was on their watch. Their purpose was to do research that proved the literal Bible, not research to advance mankind. They impeded progress in chemistry, geology, geography, medicine, and physics at every turn.

The Church theories of "God's Will" and heresy combined with "Index" set progress back centuries and in the process murdered thousands.

John Tomikel
Corry, Pennsylvania

The writer is author of Searching For God, *published by Allegheny Press.*

Of all the articles I read, Timothy Moy's stuck in my mind the most. I'm used to atheists, from Catholic backgrounds, using Galileo as a reason for reason. Now I find out a different, and more historically logical, point of view. Brilliant! I love it when your magazine mixes history and skeptical issues. Again, *brilliant!*

Tommy Kelly
Tuscaloosa, Alabama

Lovelock's 'A Way of Life'

I admit to being somewhat offended by James Lovelock's view that agnostics are in need of a way of life ("A Way of Life For Agnostics?"). I think that we already have one—called agnosticism. Nevertheless I tried to figure out exactly what he was talking about, but failed to do so. Although he claims that Gaia is a falsifiable scientific theory, he never indicates what its falsifiable claims might be, and he speaks of it using words that are more appropriate for religious belief, such as "revere," "trust," "purpose," and "commitment." His disdain for reductionism and his mischaracterization of opposing views (such as his assertion that modern biology supposes "organisms [to] interact only with other organisms") reinforce the notion that he is not discussing science as it is generally understood. If he had hoped to recruit this agnostic to his position, then he has failed completely.

John G. Fletcher
Livermore, California

While I admire the selfless and caring aspects of the Gaia hypothesis I am concerned about some of its larger implications. As Lovelock says, we must ". . . look more closely at the ethical and philosophical aspects of Gaia." We must, of course, ask the great human question "Why are we here?," and perhaps this can be addressed within the Gaian framework. For many millions of years before our appearance, Earth, through various mechanisms, had been sequestering carbon, and perhaps Gaia felt the need for a means of redressing the carbon balance. The mechanism became evolution of a species which would mine the surplus carbon as a resource, and return it to the atmosphere. If this was our purpose, then clearly, when the balance has been sufficiently restored (which will be soon, at present or predicted rates), there will be no further need for our species. Does Lovelock feel that religious wars will be Gaia's solution, and could that be why we were evolved not only with rational minds but also with religious impulses? Or will it be accomplished just by disease and famine? In what sense should we ". . . put our trust in Gaia"?

S. Pearre, Jr.
Halifax, Nova Scotia,
Canada

Your Science and Region 2001 issue was excellent. However, I have to question the logic of including James Lovelock's "A Way of Life for Agnostics?" about the so-called Gaia theory.

I recognize that despite all the hocus pocus at their foundation, the primary organized religions such as Judaism and Christianity do fulfill real-world functions such as assisting the poor, providing moral instruction for children, etc., and despite my agnosticism I have contributed to a Catholic charity and plan on sending my little boy to a private, probably religious, school.

But Gaia tries my tolerance, as it eschews the real-world value of religion and embraces only the hocus pocus of it. In fact, by having "faith" in or "putting trust in" Gaia, as Lovelock suggests, one adds an imaginary dimension to natural phenomena that can only impede understanding in those who embrace it and speak its pseudoscientific language. Gaia breeds extremism and interferes with rational discussion of important environmental issues.

Philip Blumel
Lake Worth, Florida

The Gaia theory has always struck me as the ultimate in warm and fuzzy metaphysical nonsense. It needlessly complicates and obfuscates what is glaringly obvious, that if life on Earth were not well adapted to the terrestrial environment, we would not be discussing the matter. With trillions of stars out there, many almost certainly with planets in stable orbits, there are bound to be millions of "near-Earth" kinds, and, by the same token, some able to sustain carbon-based organisms. I can imagine an intelligent bark beetle ponder-

ing why it is that the oak tree on which it has deposited its eggs is so well suited to their growth. It would have its own Gaia situation, but so what? Other trees support different insects, often uniquely; if not, they wouldn't co-exist, and what does that prove? We fit in here so nicely because we *must or not be at all!*

Arthur Porges
Pacific Grove, California

Sparks' Belief Survey

Glenn Sparks's article "The Relationship Between Paranormal Beliefs and Religious Beliefs" recalls to mind the effect that religious instruction has had on my own (now adult) three children.

When they were in grade school I made a point of having all three attend Sunday School at the local Episcopal church. I wanted them to know something about their heritage, good and bad, so that in later life, when they encountered references to Job or St. Augustine, or other prominent figures in the Judeo-Christian tradition, they wouldn't appear as complete ignoramuses. All three dropped out of Sunday School when they reached high school, and all three are now healthy and well-balanced skeptics.

The point I wish to make is that a modest amount of religious instruction may act as a kind of inoculation, that an attenuated strain of dogma seems to act as an immunization against the more far-out and fundamentalist sects. I've observed that many young people who have fallen into crazy cults tend to come from families where no religious instruction was provided; thus, when adolescent doubts begin to surface and the hormones start squirting, these young folks are ill-equipped to deal with the blandishments of these more questionable sects. If they had been metaphorically vaccinated with a mild form of modified religious instruction, they would be in a better position to resist.

Donald Draganski
Evanston, Illinois

Glenn Sparks found almost no links between paranormal beliefs and religious beliefs in general, whereas Erich Goode (same issue page 56) found links with religious beliefs *that have a paranormal component.* Goode's results seem unremarkable, so we might reasonably expect to find links between religious beliefs and paranormal beliefs *that have a religious component* such as astrology, by which I mean serious astrology not sun sign nonsense. I know of two surveys that are relevant here.

Early in 1993 a survey of twenty-four Dutch astrologers (mostly teachers) found *they believed astrology is linked with an* ordering principle such as God. So at least some astrologers believe astrology has a religious component. Later the same year British astrologer Roger Elliot sent readers of the *Astrological Journal* a thirty-item questionnaire exploring their views on astrology and God. He received 288 replies, about a fifth of the readership (see *Astrological Journal* 1993, 35, 280–290 and 332–334). Respondents were mostly from Britain, age group mostly 40–60, most with a conventional religious upbringing, and sixty percent were female. One-third were hobbyists, the rest were full- or part-time or would-be professional astrologers.

In percent, the most relevant responses were: Has astrology molded your adult religious views? (a great deal 37, somewhat 34, not really 29). Do you believe some kind of God exists? (yes 78, perhaps 15, no 7). Does astrology make you think a God is more or less likely? (more likely 57, less likely 3, no difference 40). The sample is self-selected so the results need to be approached with caution. But as they stand it would seem that our expectation is confirmed.

Geoffrey Dean
Perth, Western Australia
Australia

Young's 'Impersonal Universe'

I recently received my copy of the Science and Religion issue and found it quite interesting. I found the article "Science and Religion in an Impersonal Universe" by Matt Young most revealing, especially his proposal of ideas to take the place of theism. You can't replace one worldview without an alternate. I do have some questions however.

I do agree that Einstein's "unbounded admiration for the structure of the world so far as our science can reveal it" is a beautiful vision, but for those of us who do not live and work in a scientific ivory tower, but instead in the busy and chaotic world of everyday life, that vision can quickly become very thin. What do you say when scientists find that the universe is one big crap shoot?

If I understand Young correctly, his views preclude the question, "What is the meaning of life?" because science cannot provide a provable answer to this question. Are you going to tell people to stop asking the question because you say there is no answer? Whatever you think about the book of Job, whether you understand it or not, whether you agree with the answer God gave Job or not, it does raise the questioning of the meaning of life, Why be good?, and *Is* life ultimately fair? I do not think that theists have all the answers, but is often more important to ask the right question. Just because people do not know the answer or cannot prove that an answer is right, does not mean that the question is foolish or unimportant or without meaning.

Rev. Roger A. Sawtelle
Lowell, Massachusetts

Weinberg's 'Designer Universe?'

The article I liked best is also the one I disagree with most, since it perpetuates a key misconception in the science-religion discussion.

When pondering "A Designer Universe?," Steven Weinberg rightly discerns "the question . . . worth answering . . . is whether the universe shows signs of having been designed by a deity more or less like those of traditional monotheistic religions—not necessarily a figure from the ceiling of the Sistine Chapel, but at least some sort of personality, some intelligence, who created the universe. . . ."

Yet to Weinberg, traditional deities (such as those named "God") cannot correctly be considered more philosophical, abstract entities: "You are certainly free to think . . . of something much more abstract, some cosmic

spirit of order and harmony, as Einstein did. . . . But then I don't know why you use words like 'designer' or 'God,' except perhaps as a form of protective coloration."

"Protective coloration" indeed! What, is calling an abstract creator "God" now some sort of cowardly, chameleon act of cultural camouflage?

Surely Weinberg is not so naive, or arrogant, to think that only he and (perhaps!) his contemporaries have workable notions of the would-be divine.

Countless believers throughout history have also considered their God a "cosmic spirit of order and harmony," and yet still find it fitting to address Him or Her (or It) as God. What's wrong with that? Why is doing so an act of so-called "protective coloration"? Protection from what? Indeed, even Einstein himself spoke of his "cosmic religious feeling" as God so often that Niels Bohr quipped, "Stop telling God what to do!" But honestly, what other word is there?

Whether personal or not, such a being, force, collection of forces, matter, energy, nature, and/or other suitable, similar entity (or entities) is deserving of our contemplation, attention, respect, reverence and awe—if not worship. God—the endless creative mystery—thus often evokes what is called a "cosmic religious feeling," in scientists and nonscientists alike.

As soon as such a common-sense definition gets wide hearing, may we all go about our business more humbly and ignore mere differences of opinion. We can comfortably disregard the more absurd attributions to deity, and debate more informed speculations.

I concur with Carl Sagan (as noted in Frazier's review of *A Biologist Looks at Religion*) that "there is true spirituality in our reverence and awe for nature." Let's not hesitate to call the mystery that begins with but may not entirely end with nature, "God," however much we may wish to distinguish our sophisticated belief and practice from ancient tribal and nomadic religion which employed the same term in the global struggle for understanding.

Nathan Braun
Christian Skeptics Society
http://skeptical.faithweb.com

Your effort to contrapose religion and science was less successful than it was two years ago. CSICOP should probably avoid this discussion in the future. While admirably equipped to take on the usual nonsense, CSICOP is ill equipped to tackle a philosophical and intellectual project so large and so integral to the human condition. As just one example, this quote from Steven Weisberg's essay: "Either you mean something definite by a God . . . or you don't. If you don't, then what are we talking about?"

This is fine science talk but pointless and impertinent people talk. Substitute any of the following words for the words "a God" in Weinberg's sentence: hope, love, hate, fidelity, pain, compassion, success, failure, beauty, triteness, joy, anger, justice.

We humans live in a world of uncertainty, whose borders often escape us. Religion is our effort to give this world some form and meaning, and succeeds in ways that science neither can nor should attempt. Our lives play out on a field that is to a considerable degree ill defined and inconsistent of necessity, and religion mirrors this reality. Though we may find its mythology primitive, religion can give us an intellectual and moral space in which to find degrees of freedom and restraint from rigid definition and scientific cant.

Cress Kearny
Oakland, California

Clarke's 'Credo'

I am writing to point out an error in the "Arthur C. Clarke's 'Credo'" article. I am referring to the sentence "I also, rather mischievously, demolished Alpha by invoking Kurt Gödel, whose notorious 'incompleteness of knowledge' theorem quite obviously rules out the existence of an omniscient being."

The Gödel Incompleteness Theorem applies only to formal logic systems axiomatized in a certain way. What it says is that if the logical system contains enough mathematical axioms to include arithmetic and is consistent, then there are some true statements that cannot be proved within the system. In fact, Gödel showed how to write such a statement. The important point is that Gödel Incompleteness Theorem has to do with provability in logical systems, not with knowledge in general. In fact, Gödel knew that his statement is true, even though he showed that it cannot be proved.

Therefore it is misleading to call Gödel's result the "incompleteness of knowledge" theorem, because it does not deal with knowledge in general. After all, we may know many things that have nothing to do with formal logical systems. Thus the Gödel Incompleteness Theorem does not rule out, obviously or otherwise, the existence of an omniscient being.

John Grant
Baltimore, Maryland

Editor's Note: We unfortunately introduced (at least) two typos into Arthur C. Clarke's essay: "proposition" for "preposition" on page 62 in the last line of the second complete paragraph in the left-hand column; and "now" for "how" on page 63 in the sixth line of the fourth complete paragraph in the right-hand column.

Nickell's 'Shroud of Turin'

Many thanks for the Science and Religion issue. As for the Nickell article on the Shroud of Turin, even the Gospels don't offer much support for the authenticity of that relic. Matthew (27:59), Mark (15:46), and Luke (23:53) all say that the body of Jesus was wrapped (or rolled or bundled) in *sindon*, Greek for fine linen. *Sindon* is a material, not a shroud, for which the Greek is *speiron*. No spices, either, 'cause the spice ladies got there too late. Further, Luke (24:13) says Peter saw "the linen strips only" (*ta othonia mona*) lying in the empty tomb. Not a piece of whole cloth, but strips, bandages, pieces, of *sindon*, a plain-weave fabric.

John gives more detail. Nicodemus brings some seventy pounds of myrrh and aloes and the corpse is tied up or bound (*edesan*) in linen strips (*othonois*) along with the aromatics above. Later Peter sees the linen bandages (*ta othonia*), and the handkerchief (*soudarion*) which was on his head. Was the linen not by this time soaked in bodily fluids, oils, resin, and savoury sawdust?

The Holy Shroud is linen of herringbone twill weave, one piece, spice and unguent free. The *soudarion*, as Nickell points out, would have blurred the shroud face. The History Channel Ancient Mystery video entitled Shroud of Turin (AAE-12310) documents for all to view the radiocarbon dating of the relic some years ago. The Church was most cooperative in that project, and the Archbishop of Turin, Cardinal Anastasio Ballestrero, publically announced the result of the tests—the linen dates 1260–1390 A.D. in October 1988. Certainly this was one of the finer examples of faith and reason making nice, and a refreshing no-nonsense approach to matters religious.

Samuel O. Donelson
Fayetteville, Arkansas □

Gardner's 'Multiverses and Blackberries'

As a physicist (but not quantum theorist) who has long been fascinated by the philosophical issues of quantum mechanics, I read with interest Martin Gardner's column "Multiverses and Blackberries" (September/October 2001). Gardner describes the apparent absurdity of the Many Worlds Interpretation (MWI) of quantum mechanics, citing it as a "radical violation of Occam's razor." This would be true if MWI was an ad hoc postulate in quantum mechanics, but the opposite is actually the case.

There is no question that wave functions describing objects at the microscopic level do branch into parallel states. However macroscopic reality is not observed to exist as parallel states, so postulates such as probability amplitude and wave function collapse were introduced in early quantum theory to squelch the branching process. This Copenhagen Interpretation and other theories that followed all accord special status to arbitrary branches of the wave function (Bohm's theory is no exception), require wave functions or potentials that violate relativity, and typically treat "observers" as special entities not themselves subject to quantum theory (as though we are not part of the universe we live in).

Then a remarkable thing happened. Everett and others discovered that if the wave function collapse postulates were dropped, the observable results of quantum theory remained intact because of decoherence effects. Collapse postulates or quantum potentials that select particular branches of the wave function were superfluous. No more paradoxes, causality violations, or New Age nonsense. Just a simple fully explanatory theory that implies (not postulates) the existence of parallel universes.

Gardner writes that "there is not the slightest shred of reliable evidence" for parallel universes. On the contrary, if the simplest possible axiom set that accounts for all that we observe (and don't observe) predicts the existence of parallel universes, then the evidentiary burden is on those who would install additional ad hoc axioms into quantum theory solely to suppress parallel universes. For there is not the slightest shred of evidence for random superluminal wave function collapse or quantum potentials. And what does Occam's razor tell us about adding axioms to theories that already fully explain observations?

Brian Wowk
Corona, California

According to Martin Gardner, all multiverse theories are "frivolous fantasies" which have so far not provided any testable predictions. With this statement, Gardner lumps together essentially different theories. The splitting universe hypothesis of Hugh Everett, David Deutsch, and others does indeed appear rather bizarre to human minds, albeit there seem to be few alternatives if we wish to reconcile quantum mechanics with an objective, observer-independent physical world. The concept of Andrei Linde, further developed more recently by Lee Smolin, is unrelated to the splitting universe hypothesis and, in fact, does make predictions that can be tested experimentally. To explain the fine tuning of fundamental physical constants allowing a universe with stars, galaxies, and life, Smolin proposes that each black hole generates a new universe inside, in which the initially randomly assigned physical constants become slightly changed. The consequence is obvious: the more black holes a given universe produces the more daughter universes it will have, resulting in "evolution" of blackhole-producing universes. Smolin's key assumption is that the efficiency of black hole production is positively correlated with hospitability to life. This concept elegantly explains the improbability of our being here as a process of continuous evolution, from the Big Bang to human culture. For Gardner "the conjecture *that there is just one universe . . . is infinitively* simpler and easier to believe than that there are . . . billions of worlds." However, nature doesn't appear to care about the simplicity of our beliefs. Before Copernicus, few individuals could imagine that planetary systems could be "as plentiful as blackberries." We should have learned our lesson!

Bernd Mayer
Graz, Austria

When the singular scrivener Martin Gardner dubs Deutsch and Lewis's multiverse theories as "frivolous fantasies . . . lacking the slightest shred of reliable evidence," I nod in agreement. But when he goes on to "marvel at the low state to which today's philosophy of science has fallen," I think some record-correcting is in order.

To be sure, a few philosophers have touted the putative merits of multiverses. Is this enough to disparage an entire field of inquirers? If so, then physics itself would in be trouble, owing to its multiverse standard-bearers, David Deutsch and Hugh Everett III.

So perhaps Gardner believes that *most* (or *many*) philosophers of science pay homage to multiverse theories? That would indeed be a serious charge; so it's a happy fact that philosophers of science are by and large innocent on that score. In fact, as David Lewis himself points out, he's quite accustomed to the "incredulous stares" of his colleagues.

One last clarification. "Both the MWI and Lewis's possible worlds," Gardner writes, "allow time travel into the past...[where] as you enter your past, the universe splits into a new one in which you and your duplicate coexist." A more careful reading of Lewis, however, soon shows that this misportrays his position. To wit, Lewis explicitly posits that "unactualized possible" Martins or Timothys are, in fact, "confined each to his own world."

Intriguingly, Lewis is also bearish on talk of time travel involving such multiverse-apparati as Deutsch supports. For details, interested readers are invited to consult Lewis's "The Paradoxes of Time Travel," vol. 13, *American Philosophical Quarterly* (1976), pages 145–152.

Timothy Chambers
Department of Philosophy
Brown University
Providence, Rhode Island

I was shocked at Martin Gardner's reaction to the Many Worlds Interpretation by stating, "I can only marvel at how low the state to which today's philosophy of science has fallen." This low state includes some powerful proponents in Hawking and Weinberg.

MWI is no less palatable an explanation of the duel-slit experiment than having the wave function collapse when an intelligent being observes it.

What qualifies as an intelligent being? Would the wave function collapse if a chimp made the observation? Would Schrodinger's cat assume a dead or live state if his dog peeked in the box?

The truth is, both of these interpretations seem "grotesque" and "silly" but that does not preclude one from being both true and parsimonious. The fact that many physicists choose to ignore the issue does not make the observations in this classic, empirical experiment go away.

Gary Barker
Saginaw, Michigan

I thoroughly enjoyed Martin Gardner's look at the wild world(s) of "Multiverses and Blackberries." However, I think that Occam is still pondering the question. He is asking which of the following is simpler:

1. A single universe with a mechanism to prevent additional ones from cropping up.
2. Multiple universes with a mechanism to create them.

Paul C. Anagnostopoulos
Carlisle, Massachusetts

If Martin Gardner really believes there is only one universe, then how is he able to quote clerihew poet Armand T. Ringer, who happens to be Gardner's anagrammatic double in another universe?

Don Z. Block
Malvern, Pennsylvania

Unprovable Negatives?

Don't some of us love to pick on your excellent frequent contributor, Ralph Estling! I enjoy his thoughtful essays, and he expresses reasonable ideas fairly. Maybe he can clarify one point of logic. In his answer in "Forum," September/October 2001 issue we read ". . . as I'm sure you know, negatives are impossible to disprove in logic."

He is not alone. In Charles M. Wynn and Arthur W. Wiggins, *Quantum Leaps in the Wrong Direction* (2001; a good brief summary of the last ten years of SKEPTICAL INQUIRER, by the way—you may want to review it), I read on page 165 in italics: It is impossible to prove a universal negative.

Whose theorem is this? (Oops—can't be a theorem, being a negative! Watch for paradox when you see a self-referring statement.) Whose conjecture is this? I can't find it in the three logic textbooks on my shelf.

On the contrary I have seen excellent proofs of propositions like DeMorgan's Laws, clearly negatives, the simple proof of the negation of p-and-not-p based on Russell's first axiom, the classic proof that the square root of two *cannot* be expressed as a ratio of relatively prime integers, illustrating indirect proof, and on an on.

Are we talking about existence proof only? What is it we can't do in logic?

Richard S. Dolliver
Windsor, Connecticut

TV Station's Skeptical Investigation Laudable

The purpose of this letter is to praise a local (Los Angeles) television station for its

skeptical broadcast on August 2, 2001. The subject was magnetic fuel enhancers for automobiles. This subject was discussed briefly in the January/February 1998 issue of *SI*, with no definite conclusions other than: "buyer beware." How the Channel 7 (ABC in L.A.) newsroom became aware of the magnetic fuel economy enhancers and why they decided it was a newsworthy item is immaterial. What is important is that they decided to test the devices and report the results of their tests to the public. While their tests cannot be considered scientific they at least showed skepticism.

They tested two vehicles for a month without the devices and a month with the devices and estimated the average gasoline mileage for each. What they reported to the public was that for both vehicles tested, the gasoline mileage was poorer with the magnetic devices installed than without them. While public notice of the likely ineffectiveness of the magnetic device may not be "lighting a candle in the dark," it contrasts sharply with the increasing number of programs labeled news with decreasing quality of programming. When even the National Geographic channel carries advertisements by "Miss Cleo," this broadcast by the Channel 7 newsroom affords a rare opportunity to compliment them for their skeptical attitude. All I can do is to publicly give them my ten "attaboys," Channel 7. I would hope that CSICOP can do more.

Donald F. Weitzel
Winnetka, California

Correction: Dropped Paragraph in Sheldrake Article

A note from the Editor:

In Rupert Sheldrake's "Research on the Feeling of Being Stared At," a Follow-Up section article in our March/April 2001 issue, 25(2):58–61, it turns out that we inadvertently dropped a paragraph in production, and the omission changed his meaning and rendered part of his argument difficult to comprehend. The paragraph in question had been in his article through galley proofs, which Sheldrake had seen and approved, but was somehow accidentally omitted in the layout process. No one noticed until Sheldrake did recently. In fact, a letter to the editor in our July/August 2001 issue by Glenn Rimbey expressed confusion about a Sheldrake comment about Richard Wiseman's ineffective stares. "No wonder he was confused," Sheldrake tells us. "With the key paragraph omitted, my argument makes almost no sense."

We apologize for the dropped paragraph, which should have appeared after the first two lines at the top of the third column on page 60 of the March/April 2001 issue. It appears in its entirety below:

> There is already experimental evidence that different starers can obtain very different results. In tests carried out through closed-circuit television, Richard Wiseman, a skeptic, obtained results at chance levels when he was the starer. In the same experiment, another starer, Marilyn Schlitz, obtained statistically significant positive results (Wiseman and Schlitz 1997), replicating her significant positive results in previous experiments of this kind (Schlitz and LaBerge 1994, 1997). □

The letters column is a forum for views on matters raised in previous issues. Letters should be no more than 225 words. Due to the volume of letters not all can be published. Address letters to Letters to the Editor, SKEPTICAL INQUIRER. Send by mail to 944 Deer Dr. NE, Albuquerque, NM 87122; by fax to 505-828-2080; or by e-mail to letters@csicop.org (include name and address).

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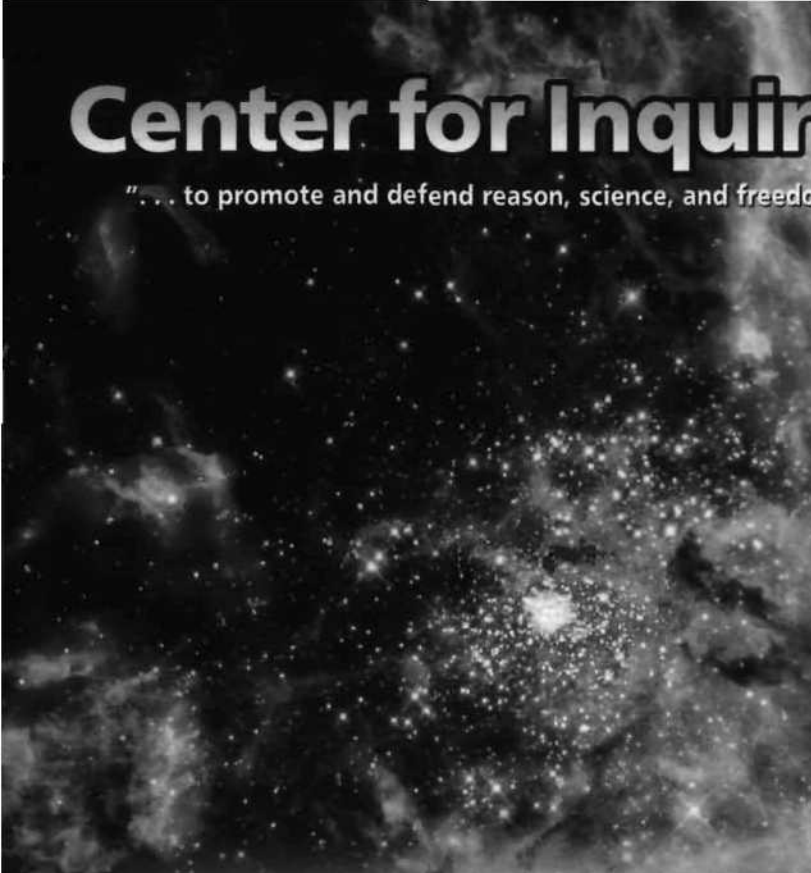

Hubble's Panoramic Portrait of a Vast Star-Forming Region

NASA's Hubble Space Telescope has snapped a panoramic portrait of a vast, sculpted landscape of gas and dust where thousands of stars are being born. This fertile star-forming region, called the 30 Doradus Nebula, has a sparkling stellar centerpiece: the most spectacular cluster of massive stars in our cosmic neighborhood of about 25 galaxies. The mosaic picture shows that ultraviolet radiation and high-speed material unleashed by the stars in the cluster, called R136 (the large blue blob left of center), are weaving a tapestry of creation and destruction, triggering the collapse of looming gas and dust clouds and forming pillar-like structures that are incubators for nascent stars.

Credits: NASA, N. Walborn and J. Maiz-Apellániz (Space Telescope Science Institute, Baltimore, MD), R. Barbá (La Plata Observatory, La Plata, Argentina)

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